Snap Server® Administrator Guide

GuardianOS v3.2

For GuardianOS-powered Snap Servers and Snap Disk Expansion Arrays

Snap Appliance™

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Audience and Purpose

This guide is intended for system and network administrators charged with installing and maintaining Snap Servers on their network. We assume the administrator is familiar with the basic concepts and tasks of multiplatform network administration.

This guide provides information on the installation, configuration, security, and maintenance of Snap Servers. It also provides information on installing and using the following utilities and software components:

- Snap Server Manager (SSM)
- The Administration Tool
- Computer Associates eTrust Antivirus (CA *e*Trust Antivirus)
- Third-party backup agents

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Tips and Cautions

Conventions used to call out useful or important information are described next:

Tip A tip presents time-saving shortcuts related to the main topic.

Caution A caution alerts you to potential hardware or software issues or hazards in the configuration or operation of Snap Servers. Consider cautions carefully before proceeding with any operation.

Typographical Conventions

Convention	Usage
Italic	• Emphasis • The introduction of new terms • File names • Settings you select or enter in the Administration Tool
Arial Bold	Navigational paths, command buttons, and navigational links.
Arial	• Text you type directly into a text field, a command line, or a Web page • Buttons on a keyboard
Courier Italic	A variable for which you must substitute a value
`Courier Bold`	Commands you enter in a command-line interface
`Right-Click`	This document uses the Windows convention in describing keyboard access to context-sensitive menus. For example, “To rename a group, right-click a group and then select Rename.” Macintosh users should substitute control-click to achieve the same result.

Finding More Information

Product documentation related toGuardianOS Snap Servers and Snap Disk expansion arrays are listed below. The current versions of all these documents are always available from the Snap Appliance documentation center at http://www.snapappliance.com/support .

Source and Location	Content
Quick Start Guide Product Packaging and Web	Details package contents, identifies server hardware components, and provides complete instructions for installing the server to a rack and connecting the server to the network. Also contains the EULA, warranty, and registration card.
Snap Server Administrator Guide User CD and Web **Snap Server Online Help** Administration Tool	Provides an overview of the configuration, maintenance, and troubleshooting of Snap Servers, the administration of the CA *e*Trust Antivirus software, and the installation of third-party backup agents. The online help also provides detailed instructions on using the Administration Tool.
Release Notes.html User CD	Contains late-breaking information, corrections, and known issues concerning Snap Servers.
Upgrade.html User CD	Provides instructions for upgrading the GuardianOS software.
Snap Server Manager (Install.html) User CD	Provides instructions for installing the Snap Server Manager administrative utility.
NetVault Documentation Product Packaging and User CD	Snap Appliance provides a Client Installation Guide in the NetVault CD case. The NetVault CD includes the complete NetVault documentation set.
DataKeeper Quick Start Guide Product Packaging and Web	Provides instructions for installing the Powerquest DataKeeper client backup software.
Field Service Documentation Service CD and Web	Provided detailed instructions for the replacement of disk drives, SCSI cards, power assemblies, slide rails, and other hardware components.
Hardware Specifications User CD	Lists hardware specifications for Snap Servers and Snap Disk expansion arrays.

Administrative Overview

Snap Servers are designed as flexible, low-maintenance network file servers optimized for performance and efficiency. Snap Servers run the GuardianOS, built to maximize file I/O throughput across multinetwork protocols. To this end, all unnecessary system control and processing functions that are associated with a general-purpose server have been removed.This guide applies to the following Snap Servers and expansion arrays:

Snap Unit	Description
Snap Server 18000	The Snap Server 18000 is a 2U enterprise file server with 8 hot-swappable SATA disk drives and redundant power supplies and fans. The Snap Server 18000 supports up to 7 Snap Disk 30SA or Snap Disk 32SA expansion arrays.
Snap Server 15000	The Snap Server 15000 is a high-performance, 1U NAS head that supports multiple Snap Disk 30SA or Snap Disk 32SA expansion arrays, and contains four redundant, hot-swappable disk drives.
Snap Disk 30SA	The Snap Disk 30SA is a 3U expansion array with 16 hot-swappable SATA disk drives. Works with the Snap Servers 15000 and 18000 only.
Snap Disk 32SA	The Snap Disk 32SA is a 3U expansion array with 16 hot-swappable SATA disk drives. Works with the Snap Servers 15000 and 18000 only.
Snap Server 14000	The Snap Server 14000 is a 3U enterprise file server with 12 hot-swappable disk drives and redundant power supplies and fans.
Snap Server 4200	The Snap Server 4200 is a 1U departmental file server with four hot-swappable disk drives.
Snap Server 4500	The Snap Server 4500 is a 1U departmental file server with four hot-swappable disk drives.
Snap Disk 10	The Snap Disk 10 is a 1U expansion array with 4 ATA disk drives. Works with the Snap Server 4500 only.

GuardianOS Specifications

These specifications apply to all Snap Servers and expansion arrays running the most recent version of the GuardianOS.

Feature	Specification
Network Transport Protocols	TCP/IP UDP/IP AppleTalk iSCSI
Network Block Protocols	iSCSI (Block)
Network File Protocols	Microsoft (CIFS/SMB) UNIX (NFS v2.0/3.0) Apple (AFP v2.0) HTTP, HTTPS v1.1 File Transport Protocol (FTP)
Network Client Types	Microsoft Windows 95/98/ME/NT 4/2000/XP/2003 Macintosh Systems OS 8.x/9.x,X v10.x Sun Solaris v7/8/9 HP-UX v11 AIX v4.3.3/5.3 Red Hat Linux v6.2/7.2/8.0/9.0
File Server Emulation	Windows 2000/2003/NT 4 AppleShare 6.0 NFS v2/v3
Network Security	CA *e*Trust Antivirus software Microsoft Active Directory Service (ADS) Windows NT Domain (member server) UNIX Network Information Service (NIS) File and Folder Access Control List (ACL) Security for Users and Groups Secure Sockets Layer (SSL v2/v3) 128-bit Encryption Target CHAP Authentication

Feature	Specification
System Management	Browser-based Administration Tool for remote system administration Snap Server Manager utility (platform independent) SNMP (MIB II and Host Resource MIB) User disk quotas for Windows, UNIX/Linux, Mac, FTP Group disk quotas for UNIX/Linux Environmental monitoring E-mail notification
RAID Options	RAID 5 (drive striping with parity): For each array, the size of one drive is reserved for parity. Provides the best combination of performance and data protection. RAID 1 (drive mirroring): One or more drives duplicate one drive for maximum data protection. RAID 0 (drive striping): Large virtualdrive with data striped across all drives of the array to provide maximum performancewith no loss in usable capacity. Global hot spare support Instant Capacity Expansion (I.C.E.) logically groups RAIDs for dynamic online scalability

Feature	Specification
Data Protection	Snapshots for immediate or scheduled point-in-time images of the file system. Local Backup with BakBone Netvault Workgroup Edition. Network Backup with VERITAS NetBackup/Backup Exec, CA BrightStor ARCserve/Enterprise, Legato NetWorker, BakBone Netvault, Microsoft Backup Software for Windows 95/98/NT/2000/Me/XP, or Dantz Retrospect (Macintosh). NDMP v2/3 Support Symantec PowerQuest DataKeeper software (unlimited user license) included for backup and restore of Windows clients. Symantec PowerQuest V2i Protector Desktop Edition for image-based backup and restore of Windows clients. Compatible with Symantec PowerQuest V2i Protector Server Edition for image-based backup and restore of Windows servers. APC-brand UPS with Network Management Cards are supported for graceful system shutdown.
DHCP Support	Supports DHCP for automatic assignment of IP addresses

New Features in this Release

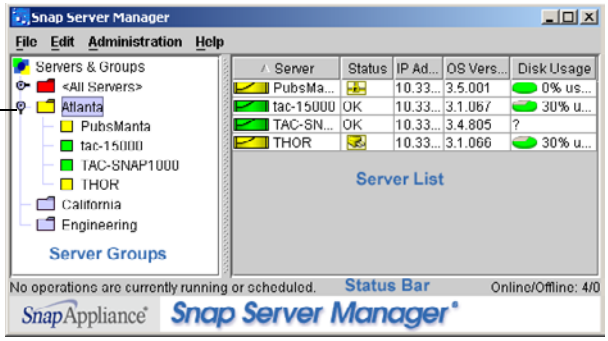
The major enhancements listed in the following table have been included in the latest release.

Feature	Description
iSCSI Multi-initiator Support	Using the Microsoft iSCSI initiator, multiple initiators can now target the same iSCSI disk.
BakBone NetVault 7.1.1	NetVault 7.1.1 is now pre-installed on the Snap Server. Previous versions of the GuardianOS shipped with NetVault 7.1. This new version provides support for Windows XP.

Snap Server Manager

Snap Server Manager (SSM) is a Java-based, platform-independent, multiserver administrative application that runs on all major platforms. SSM provides a single interface from which administrators can discover, configure, and monitor all Snap Servers on their network. With SSM, administrators can compare, copy, and configure settings for groups of GuardianOS Snap Servers in a single operation. Status information on SnapOS Snap Servers is available on a server-by-server basis.

Right-click a server group to administer multiple servers at the same time



Installing Snap Server Manager

You can download and install Snap Server Manager using the *Install.html* file found on your Snap Server User CD. Snap Server Manager can be installed to all client platforms, including Windows, Macintosh OS X, Linux, and UNIX. The installation program allows you to download the required Java Virtual Machine (JVM) for each platform as necessary. The client machine on which Snap Server Manager resides must meet the following requirements:

- **Java Requirements —** JRE 1.4.0 or higher must be installed.
- **MacOS requirements —** If you plan to run Snap Server Manager on a Macintosh client, you must upgrade the client to MacOS 10.2 or higher. (Required for JRE 1.4.0 or higher support.)

Launching Snap Server Manager

Launch Snap Server Manager using one of the methods described in the following table:

Operating System	Procedure
Microsoft Windows 98/NT/XP/ Me/2000/2003	Click **Start**. Point to **Programs >** Snap Server Manager **Manager**, then select Snap Server Manager.
Macintosh v10.2 or higher	Open the Snap Server Manager folder and double-click the Snap Server Manager icon.
UNIX/Linux	For default options: cd to home directory, then run the Snap Server Manager command: **`./Snap_Server_Manager`** If you selected not to create links: cd to home directory, then cd to the Snap Server Manager directory, and run the Snap Server Manager command: **`./Snap_Server_Manager`**

Multiserver Administration (GuardianOS Snap Servers Only)

Multiserver administration is available only for GuardianOS Snap Servers.

- **Simultaneous application of settings to server groups —** You can organize GuardianOS servers into functional groups and apply settings to all servers in the group simultaneously.
- **Comparing settings across servers —** Snap Server Manager can compare settings across any number of GuardianOS servers and highlight settings that differ.
- **Copying settings from one server to one or more different servers —** SSM can compare settings across any number of GuardianOS servers and identify when settings differ among servers. For example, comparing protocol access configuration for a group of servers may reveal that settings are consistent for Windows, NFS, and AFP but that differences exist among servers in HTTP/ HTTPS and FTP settings.
- **Scheduling operations to run during offpeak hours —** Operations can be scheduled to run on multiple GuardianOS servers during offpeak hours.
- **Automatic e-mail notification of completed operations —** You can configure SSM to send an operations report (CSV format) upon completion of any operation.

Connecting to the Server for the First Time

Snap Servers are preset to acquire an IP address from a DHCP server. If no DHCP server is found on the network, the Snap Server defaults to an IP address of 10.10.10.10, and you may not be able to see the server on your network. You can discover a Snap Server using either the default server name or the Snap Server Manager (SSM) utility. Use the server name method if you are installing one Snap Server on the network. Use SSM if you are installing two or more Snap Servers, or if your network does not have a DHCP server.

Tip The LCD panel on the Snap Server 14000 and 18000 displays its default server name and IP address.

To Connect Using the Server Name

This procedure requires that name resolution services (via WINS or an equivalent service) be operational.

1. **Find the server name.**

   The default server name is SNAP*nnnnnn,* where *nnnnnn* is the server number. For example, the name of a Snap Server with a server number of 610019 is SNAP610019. The server number is a unique, numerics-only string that appears on a label affixed to the inside of your Snap Server. To view the label, remove the front bezel (4200 and 4500) or read the LCD display (14000 and 18000).

2. **Connect to the server.**

   In a Web browser, enter the following URL:

   `http://SNAP`*nnnnnn* (where *nnnnnn* is the server number)

   Press Enter. The Web View screen opens.

3. **Log into the Administration Tool.**

   Click the **administration** link, and in the login dialog box, enter *admin* as the user name and *admin* as the password, and then click **OK**.

4. **Complete the Initial Setup Wizard.**

   For instructions for using the Initial Setup Wizard, see page 8.

To Connect to a Snap Server Using Snap Server Manager

1. **Install and launch Snap Server Manager.**

   Install and launch Snap Server Manager (see page 5) on a machine residing on the same network segment as your Snap Server(s). Upon startup, Snap Server Manager displays the IP address of each Snap Server on its local network segment.

Using the Initial Setup Wizard

The first time you connect to a Snap Server via the browser-based Administration Tool, the Initial Setup Wizard runs. The Initial Setup Wizard consists of several screens that allow you to change the server name, set the date and time, set the administrator password, configure TCP/IP settings for the primary Ethernet port (Ethernet1), and register the server.

Server Name

The default server name is SNAP*nnnnnn*, where *nnnnnn* is the server number. If desired, enter a unique server name of up to 15 alphanumeric characters. In addition to letters and numbers, you can also use a dash (-) between characters, but spaces are not allowed.

Date/Time Settings

The Snap Server time stamp applies when recording server activity in the event log (Monitoring tab), setting the create/modify time on a file, and when scheduling snapshot, antivirus, or S2S operations. Edit the settings according to local conditions.

Changing the Administration Password

The default administrator user name is *admin* and the default password is also *admin*. A password must consist of 1 to 15 alphanumeric characters and is case sensitive. To prevent unauthorized access to the Snap Server, enter a secure password immediately in the fields provided.

Gathering TCP/IP Addressing Information

Snap Servers are preset to acquire an IP address from a DHCP server. If you do not plan to use or do not have a DHCP server, assemble the following information prior to running the wizard:

- The IP address for the Snap Server (required)
- The subnet mask (required)
- The default gateway IP address
- The domain server IP address
- WINS server(s) IP address(es)

Server Registration

You must register your server to activate your warranty, to receive Snap Care service and support, to create and track service requests, to download software updates, and to receive exclusive promotional offers.

Tip You can register multiple Snap Servers in one operation using Snap Server Manager. For more information, install SSM (see page 5) and refer to the online help.

To Register a Single Server

You can register your server as part of the Initial Setup Wizard, or at a later time by navigating to the **System > Register** screen in the Administration Tooland clicking the **Register Online Now** link. A separate browser window opens to a product registration form in which some of your product information is already entered.

Configuring an APC-Brand UPS

Snap Appliance recommends that you use a UPS with Snap Servers and Snap Disk expansion arrays to protect your data from unforeseen power outages. Snap Servers are compatible with network-based, APC-brand uninterruptible power supplies that allow you to take advantage of the automatic shutdown capability. For instructions on configuring your APC-brand UPS device, navigate to the **System > UPS** screen and click the **Help** icon.

SnapExtensions

A *SnapExtension* is a Java application that extends a Snap Server's functionality. The SnapExtension start screen shows the current state of the components of a SnapExtension. Currently, Server to Server Synchronization is the only SnapExtension on offer.

Server to Server Synchronization (S2S)

Server-to-Server Synchronization is a SnapExtension that moves, copies, or replicates the contents of a share from one Snap Server to another share on one or more different Snap Servers.

- **Compatibility with Previous Versions of S2S —** The S2S data replication software has been redeveloped and now offers a more robust set of features than the previous versions of S2S. The increased functionality of the new S2S is **NOT COMPATIBLE** with versions distributed prior to this release (GuardianOS 3.1).
- **S2S Evaluation Period —** The new S2S included with your Snap Server is fully operational for an evaluation period of 45 days, but requires a license for each Snap Server thereafter. Information on acquiring S2S licenses is available at http://www.snapappliance.com.
- **S2S Components —** The S2S engine is a service that enables a Snap Server to participate in an S2S operation. The S2S management console is a tool that provides standard administrative controls for creating, scheduling, and managing replication jobs.

Add-On Features

Add-on features are software applications, agents, and utilities that extend the capabilities of a Snap Server. Some add-on features are fully functional out-of-the-box; others may require a download and/or the purchase of a license for full operation. For up-to-date information on feature availability, contact Snap Appliance.

You may have more Add-on features available to you than what is listed below if you have installed other Snap Appliance software, independent of the current operating system release.

Feature	Description
CA *e*Trust Antivirus	Preinstalled antivirus software that is fully functional out-of-the-box and requires no license. For information on configuring the software, see CA *e*Trust Antivirus.
BakBone NetVault	Preinstalled backup software (GuardianOS v3.0 & later) with a Workgroup Server license. For information on installing and configuring NetVault, see the documentation included with the NetVault CDs that shipped with your Snap Server.
NDMP Server	Preinstalled NDMP agent that allows the Snap Server to participate in NDMP-based backup solutions. The agent is pre-installed on all GuardianOS 3.1 or higher servers. To enable the service, a license is required. This license is currently available at no charge when you register your server.
Snap Server Manager	Utility included with your Snap Server for managing multiple Snap Servers simultaneously. Functional out-of-the-box for single-server administration only; a license is required for multiserver administration. For more information, see Snap Server Manager or the utility's online help.

Caution Backup Express, NetVault, and NDMP are mutually exclusive; only one of these solutions can be enabled at a time.

Finding More Information

Product documentation related toGuardianOS Snap Servers and Snap Disk expansion arrays are listed below. The current versions of all these documents are always available from the Snap Appliance documentation center at http://www.snapappliance.com/support .

Source and Location	Content
Quick Start Guide Product Packaging and Web	Details package contents, identifies server hardware components, and provides complete instructions for installing the server to a rack and connecting the server to the network. Also contains the EULA, warranty, and registration card.
Snap Server Administrator Guide User CD and Web **Snap Server Online Help** Administration Tool	Provides an overview of the configuration, maintenance, and troubleshooting of Snap Servers, the administration of the CA *e*Trust Antivirus software, and the installation of third-party backup agents. The online help also provides detailed instructions on using the Administration Tool.
Release Notes.html User CD	Contains late-breaking information, corrections, and known issues concerning Snap Servers.
Upgrade.html User CD	Provides instructions for upgrading the GuardianOS software.
Snap Server Manager (Install.html) User CD	Provides instructions for installing the Snap Server Manager administrative utility.
NetVault Documentation Product Packaging and User CD	Snap Appliance provides a Client Installation Guide in the NetVault CD case. The NetVault CD includes the complete NetVault documentation set.
DataKeeper Quick Start Guide Product Packaging and Web	Provides instructions for installing the Powerquest DataKeeper client backup software.
Field Service Documentation Service CD and Web	Provided detailed instructions for the replacement of disk drives, SCSI cards, power assemblies, slide rails, and other hardware components.
Hardware Specifications User CD	Lists hardware specifications for Snap Servers and Snap Disk expansion arrays.

Network Access to the Server

Snap Servers are preconfigured to use DHCP, autonegotiate network settings, and allow access to the server for Windows, NFS, Macintosh, FTP, and HTTP/HTTPS clients. Discussed next are the options for configuring TCP/IP addressing, network bonding, and access protocols. Network bonding options allow you to configure the Snap Server for load balancing and failover. Network protocols control which network clients can access the server.

Topics in Network Access:

- TCP/IP Options
- Configuring TCP/IP Settings
- Default Protocol Access Settings
- Windows SMB Access
- NFS Access
- Apple File Protocol Access
- FTP Access
- HTTP/HTTPS Access
- DHCP Server

Tip The default settings enable access to the Snap Server via all protocols supported by the Snap Server. As a security measure, disable all protocols not in use. For example, if no Macintosh or FTP clients need access to the Snap Server, disable these protocols in the Administration Tool.

TCP/IP Options

GuardianOS Snap Servers ship with Dual Gigabit Ethernet ports. The following table describes TCP/IP options; default settings appear in boldface.

Default TCP/IP Settings and Options

Option	Setting	Description
TCP/IP Addressing	**DHCP**	By default, Snap Servers acquire an IP address from the DHCP server on the network.
	Static	Administrators may assign a fixed IP address as necessary.
Network bonding	**Standalone**	The default *Standalone* setting treats each port as a separate interface, effectively disabling network bonding. Network bonding treats two ports as a single channel for failover or load balancing purposes.
	Load Balancing	An intelligent software adaptive agent repeatedly analyzes the traffic flow from the server and distributes the packets based on destination addresses, evenly distributing network traffic for optimal network performance. The Snap Server supports a server-side load balancing implementation called ALB (Adaptive Load Balancing). Switch-based load balancing (GEC or FEC) is not currently supported. Do not configure the switch ports that the Snap Server uses for GEC or FEC. **Tip** Load balancing occurs only on Layer 3 routed protocols (IP).
	Failover	This mode uses the first Ethernet port as the primary network interface and the second Ethernet port is held in reserve as the backup interface. Redundant network interfaces ensure that an active port is available at all times. If the primary port (Ethernet1) fails due to a hardware or cable problem, the secondary port (Ethernet2) assumes its network identity. **Tip** Failover mode does not provide switch fault tolerance.
Speed/ duplex	**Auto**	The default setting of *Auto* enables automatic negotiation of the speed and duplex settings based on the physical port connection to a switch. The speed setting establishes the rate of transmission and reception of data. The duplex setting causes the Ethernet port to transmit packets in one way or two ways at the same time. Hubs normally only support “half” duplex. **Tip** Auto is the only allowable setting for a Gigabit port.
	Fixed	The Snap Server may also be set to fixed speed/duplex setting. 10Mbps/half; 10Mbps/full; 100Mbps/half; 100Mbps/full **Tip** To prevent connectivity problems when changing to a fixed setting, see “Changing from Auto to a Fixed Setting” on page 16.

Configuring TCP/IP Settings

TCP/IP settings are configured on the **Network > TCP/IP** screen of the Administration Tool. This screen defaults to the current settings for the primary Ethernet port (Ethernet1).

Issues in TCP/IP Configuration

Consider the following guidelines when connecting a Snap Server to the network.

Cabling for Single-Subnet, Multihomed, or Network Bonding Configurations

All GuardianOS Snap Servers ship with two Ethernet cables for connecting the server to the network.

- **For a Single Subnet or Multihomed Configuration (Standalone) —** Standalone treats each port as a separate interface. In a single-subnet configuration, the primary port (only) is connected to the switch. In a multihomed configuration, each port is cabled to a different switch and the network connections lead to separate subnets.

  Caution Do not connect both Ethernet ports to the same network segment in Standalone mode. This configuration is not supported and will lead to unexpected results.

- **For a Network Bonding Configuration (Load Balancing or Failover) —** Network bonding technology treats two ports as a single channel, with the network using one IP address for the server. To take advantage of network bonding, both ports must be physically connected to the network; and (a) for load balancing, connected to the same switch on the same subnet; or (b) for failover, connected to different switch (in case one switch fails).

Caution If you connect only one port, use the primary port (Ethernet1). If you use Ethernet2, a number of services will not function properly.

Connect the Snap Server to the Network via a Switch

While it is possible to connect a Snap Server to the network via a hub, this configuration unduly restricts the performance of the server for the following reasons:

- Hubs do not support full-duplex. You can employ full-duplex only when the Snap Server is connected to a switch.
- Hubs do not support Gigabit speeds. Attempting to force a Gigabit setting when the Snap Server is cabled to a hub will produce unintended consequences.

The best performance possible when connected to a hub is 100 Mps/half duplex.

Make Sure the Switch is Set to Autonegotiate Speed/Duplex Settings

When the server is shipped from the factory, both ports are set to autonegotiate. This setting allows the Snap Server to base speed and duplex settings on the physical port connection to a switch. Thus, the switch/hub to which the Snap Server is cabled *must* be set to autonegotiate to initially connect to the server; otherwise, network throughput or connectivity to the server may be seriously impacted.

Changing from Auto to a Fixed Setting

You can configure a fixed setting on the **Network > TCP/IP** screen in the browser-based Administration Tool. If you change this setting, be sure to: 1) configure the fixed setting in the Administration Tool first; and second, (2) configure the switch to the same fixed setting. If you change the switch setting before you change the setting in the Administration Tool, the Snap Server may not connect to the network. The Link light on the front panel of the Snap Server will be off or amber if the server is not connected to the network.

Default Protocol Access Settings

Snap Servers are preconfigured to allow multiplatform access in heterogeneous Windows, UNIX/Linux, and Macintosh environments. The following table summarizes the Snap Server's default network protocol access configuration.

Protocol	Default	Comments
Windows (CIFS/SMB)	Enabled	Allows access to Windows clients via the workgroup *Workgroup*.
NFS	Enabled	Allows universal access to all computers running NFS without client address restrictions.
Apple (AFP)	Enabled	Allows access over an AppleTalk or TCP/IP network using the default zone.
FTP	Enabled	Allows access using the anonymous user account, which is mapped to the Snap Server's local guest user account.
HTTP/HTTPS (Internet/Intranet)	Enabled	Allows users to access files via HTTP or HTTPS using a Web or file browser. For added security, administrators may require users to authenticate over these protocols and may also disable HTTP.
DHCP Server	Disabled	Allows Snap Servers to distribute IP addresses to network clients.
SSH	Disabled	Required only when installing a supported backup agent or when troubleshooting under the direction of a technical support representative. Using SSH for any other purpose is not supported and may void your warranty.

Tip As a security measure, disable any network protocols not required in your network environment.

Windows SMB Access

Windows (SMB) settings are configured on the **Network > Windows** screen of the Administration Tool. The default settings make the Snap Server available to SMB clients in the workgroup named *Workgroup*. Language support is set to North America/Europe (code page 850); opportunistic locking is enabled, as is participation in master browser elections. See the online help for details in configuring these options.

Support for Windows (SMB)

Consider the following information when configuring access for your Windows clients.

Windows File and Folder Name Support

In Windows, most file and directory names are transmitted as a 2-byte (16 bit) UCS-2 character set. However, this is not true in every case. Some are still sent via a single byte character set. The Language Support option selected for Windows clients is used only to enable the server to accept file and folder names in a single byte character set.

Caution Do not name files and folders in unsupported languages. Such files and folders may be impossible to open or delete. Cyrillic characters are an example of characters that are not supported for use in file or folder names.

Windows Default File System Code Page Support

The default language support for the file system uses code page 1252 (Microsoft Windows Code Page - Latin 1). This code page, developed by Microsoft as a "Windows" version of the Latin 1 code page, contains most of the characters used in the US and Western Europe. For additional information on this code page, see the Microsoft specification.

Tip To determine the active code page on a Windows client, open a DOS prompt and type **chcp**, and then press Enter. The active code page displays.

Support for Microsoft Name Resolution Servers

The Snap Server supports both of the Microsoft name resolution services: Windows Internet Naming Service (WINS) and Dynamic Domain Name Server (DNS). However, when you use a dynamic domain server or a domain name server with an ADS server, make sure the forward and reverse name lookup is correctly set up.

ShareName$ Support

The GuardianOS supports appending the character ($) to the name of a share in order to hide the share from SMB clients accessing the Snap Server.

Tip The **Security > Share Access** screen contains a separate and distinct Hidden share option that hides a share from SMB, AFP, HTTP, HTTPS, and FTP clients.

NFS Access

NFS access to the server is enabled on the **Network > NFS** screen of the Administration Tool. By default, NFS access is enabled and any NFS client can access the Snap Server through the guest account. NFS client access to shares can be specified by navigating to the **Security > Share** screen, clicking the name of a share, and then clicking the **NFS Access** button along the bottom of the screen.

Support for NFS

Consider the following technical information when configuring access for your NFS clients.

Supported Protocols

Snap Servers support these versions of the NFS protocol:

Protocol	Version	Source
NFS	2.0, 3.0	RFC 1094, RFC 1813
Mount	1.0, 2.0, 3.0	RFC 1094 Appendix A, RFC 1813
Lockd	1.0, 4.0	RFC 1094, RFC1813

Supported NFS Clients

Snap Servers have been tested with these UNIX-based networking clients:

- Red Hat Linux 6.2, 7.1, 7.2, 7.3, 8.0, 9.0
- HP-UX 11, AIX 4.3.3, 5.3
- Sun Solaris 7, 8, 9

Apple File Protocol Access

Apple (AFP) settings are configured on the **Network > AFP** screen of the Administration Tool. The default settings provide access to AFP clients over an AppleTalk or TCP/IP network. Macintosh clients can access the server using the local guest user account. For more granular control over Macintosh client access, create local user accounts for Macintosh users.

AFP Configuration Guidelines

Consider the following technical information when configuring access for your AFP clients.

Terminology

Some Snap Server terms may cause confusion for those familiar with Apple terminology.

Term	Definitions
Share	A Snap Server share appears as a Macintosh volume that can be accessed through the Chooser. **Tip** Unlike standard AppleShare servers, Snap Servers allow nested shares (folders within folders). As a result, it is possible for some files or directories to appear in more than one folder.
Volume	A volume on a Snap Server is a logical partition of a RAID's storage space that contains a file system.
Right-click	This document uses the Windows convention in describing keyboard/mouse access to context-sensitive menus. For example, "To rename a group, right-click a group and then choose **Rename**." Macintosh users should substitute control-click to achieve the same result.

Distinguishing Share Names in the Chooser

By default, the Chooser identifies Snap Server shares using only the share name. To display both the share name and the server name, the *Add Server Name To . . .* check box on the **Network > AFP** screen of the Administration Tool is enabled by default. This option allows Macintosh applications to differentiate between shared folders with the same share name on multiple servers. For example, SHARE1 on SNAP61009 refers to the share named SHARE1 on the Snap Server named SNAP61009.

Macintosh Access via a Browser When Only HTTPS Is Enabled

If HTTP access is disabled, the Snap Server cannot be accessed using Internet Explorer 5.x for Macintosh. To resolve this issue, either use an alternate browser, or re-enable HTTP access on the **Network > Web** screen.

Sherlock Support for MacOS

Sherlock is supported for MacOS 8.1, 9.1, and X v. 10.1.x. For MacOS X v. 10.2.x and higher, the Find tool in the Finder window is fully supported.

Supported AFP Clients

The Snap Server supports MacOS 8.x, 9.x, and 10.x clients.

FTP Access

FTP settings are configured on the **Network > FTP** screen of the Administration Tool. By default, FTP clients can access the server using the anonymous user account, which is mapped to the Snap Server's *guest* user account and *AllUsers* group account. You can set share access and file access for anonymous FTP users by modifying permissions for these accounts. For more granular control over FTP access, you must create local user accounts for FTP users.

Supported FTP Clients

Snap Servers have been tested with the most common FTP clients and work as expected based on the commands required by RFC 959. Snap Servers have been proven to work with these products: Internet Explorer 5.0 and later, Netscape Navigator 4.0 and later.

HTTP/HTTPS Access

Web View is the screen that opens when users access a Snap Server using their Web browsers. This screen displays a list of all shares to which the user has access. Users can navigate the share structure to locate and view or download files, but they cannot modify or upload files. Web View requires the use of either Microsoft Internet Explorer (4.0 or later) or Netscape Navigator (4.7x or later).

HTTP and HTTPS are the default protocols used for browser-based access to the server. HTTPS enhances security by encrypting communications between client and server, and cannot be disabled. You can, however, disable HTTP access on the **Network > Web** screen of the Administration Tool. Additionally, you can require browser-based clients to authenticate to the server.

Tip To access the CA *e*Trust Antivirus configuration interface (on the **Maintenance > Antivirus** screen), HTTP must be enabled.

DHCP Server

DHCP server settings are configured on the **Network > DHCP** screen of the Administration Tool. To configure the Snap Server as a DHCP server, it must have a static IP address. This static address must meet two conditions: (1) it must lie outside the DHCP range of IP addresses you specify on the **Network > DHCP** screen; and (2) it must be part of the same subnet as the Snap Server to assign IP addresses. You can assign the Snap Server a static IP address on the **Network > TCP/IP** screen.

Caution Ensure that the network has no other active DHCP servers. You may negatively impact the network if you enable the Snap Server as a DHCP server while another server on the network is performing this function.

User & Group Management

Authentication validates a user's identity by requiring the user to provide a registered login name and corresponding password. Snap Servers ship with predefined local users and groups that allow administrative and guest user access to the server via all protocols. Administrators may choose to join the Snap Server to a Windows NT, Windows 2000, or Active Directory domain, and Windows clients can then authenticate to the server using their domain credentials. To accommodate NFS clients, the Snap Server can also join an NIS domain, and the Snap Server can look up user and group IDs maintained by the domain. For authentication control beyond the guest account, Macintosh and FTP client login credentials can be duplicated locally on the sever.

Topics in User and Group Configuration:

- Default User and Group Settings
- UID and GID Assignments
- Local Users and Groups
- Windows Workgroup or Domain
- NIS Domain

Default User and Group Settings

Snap Server default security configuration provides one share to the entire volume. All network protocols for the share are enabled, and all users are granted read-write permission to the share via the guest account.

UID and GID Assignments

The Snap Server uses the POSIX standard to assign user IDs (UID) and group IDs (GID), in which each user and group must have a unique ID. This requirement applies to all users and groups on the Snap Server, including local, NIS, and Windows users and groups.

If you join the Snap Server to a Windows domain, unique IDs are automatically assigned. If you join the Snap Server to an NIS domain, consider the following

guidelines: (1) the Snap Server does not recognize users or groups whose identification numbers are less than 100 or greater than 17999; and (2) each UID or GID must be unique.

Local Users and Groups

Local users or groups are created using the **Security > Users** and **Security > Groups** screens in the Administration Tool. Local users and groups are used for administrative and guest access to the server. Windows Workgroup, Macintosh, and FTP clients initially access the server using the guest account. If you require a higher degree of control over individual access to the file system for these clients, you must create local accounts.

Guidelines for Local Authentication

Consider the following technical information when configuring access for your Windows clients.

Duplicating Client Login Credentials for Local Users and Groups

To simplify user access for Windows Workgroup or Macintosh clients, duplicate their login credentials on the Snap Server. That is, create local accounts on the Snap Server that match those used to log into client workstations. This strategy allows users to bypass the login procedure when accessing the Snap Server.

Caution This strategy applies only to local users. Do not use duplicate domain user login credentials.

Default Local Users and Groups

The default local users and groups (see "Default User and Group Settings" on page 23) cannot be modified or deleted. For this reason, they do not appear on the list of users or groups on the User or Group Management screens. As you would expect, the default local users and groups do appear on the Share Access and Quotas screens.

Changing Local UIDs or GIDs

The Snap Server automatically assigns and manages UIDs and GIDs. Because you may need to assign a specific ID to a local user or group in order to match your existing UID/GID assignments, the Snap Server makes these fields editable.

Local Account Management Tools

The Snap Server offers several tools for creating, modifying, and editing local user and group accounts.

Function	Navigation Path
Local User Management	Navigate to the **Security > Users** screen, from which you can create, view, edit, and delete local users.
Local Group Management	Navigate to the **Security > Groups** screen, from which you can create, view, edit, and delete local groups.

Windows Workgroup or Domain

Windows workgroup or domain authentication is configured on the **Security > Windows** screen of the Administration Tool. In addition to joining the Snap Server to a Windows workgroup or domain, several other options are available for Windows networking: (1) you can enable guest account access to the Snap Server for all Windows clients; (2) with ADS domains, you can disable NetBIOS; and (3) for NT and ADS domains, you can specify a valid user name and password to join the domain.

Support for Windows Authentication

This section summarizes important facts regarding the GuardianOS implementation of Windows authentication.

Windows Networking Options

Windows networks use a domain controller to store user credentials. The domain controller can validate all authentication requests on behalf of other systems in the domain.

Option	Description
Workgroup	In a workgroup environment, users and groups are stored and managed separately on each server in the workgroup.
Domain (NT or ADS)	When operating in a Windows NT or Active Directory domain environment, the Snap Server is a member of the domain and the domain controller is the repository of all account information. Client machines are also members of the domain and users log into the domain through their Windows-based client machines. Windows or Active Directory domains resolve user authentication and group membership through the domain controller. Once joined to a Windows NT or Active Directory domain, the Snap Server imports and then maintains a current list of the users and groups on the domain. Thus, you must use the domain controller to make modifications to user or group accounts. Changes you make on the domain controller appear automatically on the Snap Server.

Kerberos Authentication

Kerberos is a secure method for authenticating a request for a service in a network. Kerberos lets a user request an encrypted "ticket" from an authentication process that can then be used to request a service from a server. The user credentials are always encrypted before they are transmitted over the network.

The Snap Server supports the Microsoft Windows implementation of Kerberos. In Windows 2000/2003/XP, the domain controller is also the directory server, the Kerberos key distribution center (KDC), and the origin of group policies that are applied to the domain.

Support for Microsoft Name Resolution Servers

The Snap Server supports both Microsoft name resolution services: Windows Internet Naming Service (WINS) and Dynamic Domain Name Server (DNS). However, when you use a dynamic domain server or a domain name server with an ADS server, make sure the forward and reverse name lookup is correctly set up.

Interoperability with Active Directory Authentication

The Snap Server supports the Microsoft Windows 2000 family of servers that run in native ADS mode or in mixed NT/ADS mode. Snap Servers can join Active

Directory domains as member servers. References to the Snap Server's shares can be added to organizational units (OU) as shared folder objects.

Guest Account Access to the Snap Server

The **Security > Windows** screen contains an option that allows unknown users to access the Snap Server using the guest account.

Restrict_Anonymous and PDC Access

If you have implemented the *restrict_anonymous* mechanism on your network, you may need to enter a valid domain (not local) user name and password that the Snap Server can use to communicate with the PDC. For ease of administration, Snap Appliance recommends that you create a unique user account on the domain using the following guidelines: (1) choose a name, such as *SnapServerAccess*, and include a comment that makes the function of the account clear; and (2) set the password to never expire.

NIS Domain

NIS domains are configured on the **Security > NIS** screen of the Administration Tool. The Snap Server can join an NIS domain and function as an NIS client. It can then read the users and groups maintained by the NIS domain. Thus, you must use the NIS server to make modifications. Changes you make on the NIS server do not immediately appear on the Snap Server; it may take up to 10 minutes for changes to be replicated.

Guidelines for Configuring NIS

Consider the following when configuring NIS access.

Handling UID/GID Assignments

Unless UID/GID assignments are properly handled, NIS users and groups may fail to display properly. For guidelines on integrating compatible Snap Server UIDs, see “UID and GID Assignments” on page 23.

Tip NIS identifies users by UID, not user name, and although it is possible to have duplicate user names, Snap Appliance does not support this configuration.

Storage Configuration & Expansion

Snap Servers are preconfigured as a single RAID 5, with a single volume encompassing 80 percent of RAID capacity, and a single share pointing to the volume. The default storage configuration reserves 20 percent of the data space for snapshots. If the default configuration is appropriate for your needs, you need only create the directory structure, set share access permissions, and (optionally) schedule snapshots.

You may have requirements that demand a different configuration. For example, if the information on a Snap Server is mission-critical but infrequently accessed, creating a RAID 1 may be a more suitable configuration. In another example, some administrators prefer to keep certain sensitive data, such as financial records, in a separate file system for added security.

Topics in Storage Configuration:

- Default Storage Configuration
- RAIDs
- Volumes
- Quotas
- Expansion Arrays
- Status Devices

Default Storage Configuration

All Snap Servers and the Snap Disk 10 are preconfigured as a single RAID 5, with a single volume and a single share pointing to the volume. The share access settings of the default share grant access to all users and groups over all protocols. The data

space is preconfigured to allocate eighty percent of the RAID for the file system and the remaining twenty percent for snapshots.

Drives / RAID	Snap Server 18000	8-disk RAID 5 + hot spare
	Snap Server 15000 Snap Server 4500 Snap Server 4200	4-disk RAID 5 (No hot spare configured)
	Snap Server 14000	11-Disk RAID 5 + 1 local hot spare
	Snap Disk 10	4-disk RAID 5 (No hot spare configured)
	Snap Disk 30/32SA	16-disk JBOD

Allocation	Volume	80% of RAID capacity is allocated to the default volume.
	Snapshot Pool	20% of RAID capacity is allocated to the snapshot pool.

Security	Shares	A single share points to the volume.
	Share Access	Grants read/write access to all users and groups over all protocols.
	Security Model	Windows-style file-level security (can be changed to UNIX)

RAIDs

RAIDs are created, viewed, edited, and deleted from the **Storage > RAID Sets** screen of the Administration Tool. Most Snap Servers ship with all disk drives configured as a RAID 5. Before changing the default RAID configuration, consider the following information on the Snap Server's RAID implementation.

Factors in Choosing a RAID Type

The type of RAID configuration you choose depends on a number of factors: (1) the importance of the data; (2) performance requirements; (3) drive utilization; and (4) the number of available drives. For example, in configuring the four disk drives of the 4500, the decision whether to include a hot spare in the RAID depends on the value you place on capacity vs. high availability. If capacity is paramount, you would use all drives for storage; if high availability were more important, you

would configure one of the drives as a hot spare. The following table summarizes the advantages and disadvantages of each type of RAID:

Comparative Advantages of RAID Types

Features	RAID 0	RAID 1	RAID 5
Data Loss Risk	Highest	Lowest	Low
Write Access Speeds	Fastest	Slower	Faster
Usable Capacity	Highest	Lowest	High
Disks Required	1 or more	2 or more	3 or more
Supports Hot Spares	No	Yes	Yes

RAID Groups

Two RAIDs can be grouped together to neatly resolve a number of capacity issues. For example, a volume on one RAID nearing full utilization can be expanded using spare capacity on another RAID. The ability to grow volumes beyond the capacity of a single RAID allows administrators to expand a volume without reconfiguring RAIDs and allows users to continue working as usual with no interruption. Consider the following scenarios:

- **Adding a Snap Disk Expansion Array —** In a common scenario, a Snap Server 4500 configured as a RAID 5 is nearing full utilization. The administrator decides to add a Snap Disk 10 expansion array, which comes preconfigured as a RAID 5. The administrator groups the RAID from the expansion array with the existing RAID on the 4500, and then expands the size of the original volumes using the new storage from the expansion array.
- **Adapting to Unforeseen Requirements —** A Snap Server 14000 is originally configured by an administrator with two separate RAIDs, each with its own hot spare. Usage on the first RAID is higher than expected and lower on the second RAID. By combining the RAIDs, the administrator can expand the volume from the first raid using the capacity of the second.

Local and Global Hot Spares

A *hot spare* is a disk drive that can automatically replace a damaged drive in a RAID 1 or 5. Designating a disk drive as a hot spare helps ensure that data is available at all times. If one disk drive in a RAID fails or is not operating properly, the RAID

automatically uses the hot spare to rebuild itself without administrator intervention. Snap Servers offer two kinds of hot spares: local and global.

Item	Description
Definitions	**Local hot spare** — A local (or dedicated) hot spare is associated with and is available only to a single RAID. Administrators typically create a local hot spare for RAIDs containing mission-critical data that must always be available. **Global hot spare** — A hot spare that may be used for any RAID 1 or 5 in the system (assuming sufficient capacity) as necessary.

Identifying	Hot spares are identified on the **Storage > Devices** screen as follows:
	`Hotspare of md0 (RAID 1)`
	`Global Hotspare for (md0, md1, md2)`
	where the local hot spare is dedicated to a single RAID (md0), and the global spare is available to three RAIDs (md0, md1, and md2).

Interaction	When a drive in a RAID fails, the system looks for a hot spare in the following order: 1 If a local hot spare dedicated to the RAID exists, use the local hot spare. 2 If no local hot spare is available, and there is a single hot spare of sufficient capacity, use the global hot spare. 3 If no local hot spare is available, and two global hot spares of different capacity are available, use the smaller hot spare with sufficient capacity.

RAID Management Tools

The Snap Server offers several tools for configuring and monitoring RAIDs.

Function	Navigation Path
Ongoing Maintenance	Navigate to the **Storage > RAID Set** screen, from which you can create, assess, edit, and delete RAIDs.
E-mail Notification	The server can notify you when a RAID is degraded. This allows you to take action to ensure workflows are not disrupted (Settings tab).

Volumes

Volumes are created, viewed, edited, and deleted from the **Storage > Volumes** screen of the Administration Tool. The default volume organizes the Snap Server's storage capacity into a single volume with a single file system. If you need separate file systems on the same server, you can delete the default volume and create two or more smaller volumes in its place. Consider the following facts and guidelines when planning your new volume configuration.

Volumes and the Snapshot Pool

The default RAID capacity is divided between the file system (80 percent) and the snapshot pool (20 percent). You may need to adjust this figure depending on your snapshot strategy. You can increase or decrease snapshot pool size at any time. For more information, see "Estimating Snapshot Pool Requirements" on page 57.

Deleting the Default Volume Deletes the NetVault for GuardianOS Database Directory (NVDB) and Antivirus Software

The nvdb directory (containing files that keep track of the data you back up), and the antivirus software reside on the default volume. If you delete the default volume, these components will also be deleted.

- To retain nvdb information, you must back up the nvdb directory (see page 63) before you delete the volume, create your new storage configuration, and then restore the directory.
- After creating your new storage configuration, you can reinstall the software by navigating to the **Maintenance > Add-On Features** screen, selecting CA Antivirus, and then on the screen that opens, selecting *Yes* and clicking **Save**. The Snap Server reinstalls the antivirus software (using default settings) on the volume with most available space. The installation process does not preserve custom antivirus configuration settings. Make a note of any such settings before deleting a RAID or volume.

Tip If the volume on which the nvdb directory or the antivirus software reside is deleted on a multivolume configuration, the system attempts to move the items to an another volume with the most available space.

Expanding Volume Capacity

A volume's capacity can be expanded on the Volume - Edit screen of the Administration Tool. To access this screen, navigate to the **Storage > Volumes** screen and click the name of a volume. There are two ways to expand the size of a volume.

- **Adding Unallocated Capacity —** If there is unallocated capacity remaining on the RAID, you can add this capacity to the volume simply by editing the size field and clicking **Save**.
- **Creating a New RAID —** If all capacity on the RAID is allocated, and either: (1) a sufficient number of drives to create a new RAID exists, or (2) a RAID of the same type with excess capacity exists, the **Expand Volume** button appears. Click this button to create an additional RAID and automatically add its entire capacity to the existing volume.

Security Models, SnapTrees, and Volumes

Volumes and directories created on the root of a volume (aka SnapTree directories) are assigned either a Windows- or a UNIX-style security model. The security model determines the file-level security scheme that will apply to files and folders within the volume or SnapTree directory.

New volumes default to the Windows-style security model. The security model of a volume determines the security model to which newly created SnapTree directory will default. Security models for a volume can be changed on the **Security > SnapTrees** screens.

Volume Management Tools

The Snap Server offers several tools for monitoring and controlling how storage space on a volume is used.

Function	Navigation Path
Ongoing Maintenance	Navigate to the **Storage > Volumes** screen, from which you can create, view, edit, and delete volumes.
E-mail Notification	The server can notify you when a volume is full. This allows you to increase volume size or take other actions to ensure workflows are not disrupted (Settings tab).
Volume Usage	To view the current utilization totals for each volume, navigate to the **Monitoring > Volume** screen.
Quotas	Use quotas (Storage tab) to limit the amount of storage space on a volume that specific users or groups can consume.

Quotas

Quotas are enabled, viewed, edited, and deleted from the **Storage > Quotas** screen of the Administration Tool. Assigning quotas ensures that no one user or group consumes a disproportionate amount of volume capacity. Quotas also keep tabs on

how much space each user or group is currently consuming on the volume, allowing for precise tracking of usage patterns. You can set individual quotas for any local, Windows domain, or NIS user known to the Snap Server. Group quotas are available only for NIS groups.

Default Quota Assignments and Ranges

When you add a user to the quota table, the quota defaults to 100 MB; for a group, the default is 1000 MB. Quotas may range from 1 MB up to the total capacity of the volume.

How the Snap Server Calculates Usage

In calculating usage, the Snap Server looks at all the files on the server that are owned by a particular user and adds up the file sizes. Every file is owned by the user who created the file and by the primary group to which the user belongs. When a file is copied to the server, its size is applied against both the applicable user and group quota.

Expansion Arrays

Snap Appliance offers three expansion arrays for increasing the capacity of Snap Servers.

- **The Snap Disk 10 —** The Snap Disk 10 storage subsystem is a 1U expansion array with four ATA disk drives and a single Serial ATA connector. It ships as a 4-disk RAID 5 with no hot spare. Up to two Snap Disk 10s can be connected to a Snap Server 4500.
- **The Snap Disk 30SA —** The Snap Disk 30SA storage subsystem is a 3U expansion array with sixteen Serial ATA disk drives and two fibre channel connectors. It ships as a JBOD. Up to seven Snap Disk 30SAs can be connected to a Snap Server 15000 or 18000.
- **The Snap Disk 32SA —** The Snap Disk 32SA storage subsystem is a 3U expansion array with sixteen Serial ATA disk drives and two fibre channel connectors. It ships as a JBOD. Up to seven Snap Disk 32SAs can be connected to a Snap Server 15000 or 18000.

Tip Details on installing a Snap Disk 10, a Snap Disk 30SA, or a Snap Disk 32SA are provided in the *Snap Disk Quick Start Guide* that comes packaged with each expansion array. The guides are also available for download from the Snap Appliance website.

The Snap Disk 10

The Snap Disk 10 expansion array allows you to expand the capacity of a Snap Server 4500 (only) without increasing administrative tasks. You can attach up to two Snap Disk 10s via a Serial ATA cable to a Snap Server 4500. Each expansion array holds four disk drives.

A Snap Disk 10 expansion array is powered on, connected to the network, and managed though the Snap Server 4500 to which it is connected. The expansion array has no power button, physical connection to the network, or independent IP address. After the array is installed and the host server is powered on, the expansion array automatically powers on as well. The Snap Server 4500 adopts the four new disk drives of the array into its storage configuration.

Preparing the Snap Server 4500

The following modifications must be made to the host Snap Server 4500 before the installation of a Snap Disk 10 expansion array.

- **Serial ATA Card —** You must purchase (from an authorized Snap Appliance reseller) and install a SATA card on the Snap Server 4500 before connecting a Snap Disk 10.
- **OS Requirements —** The Snap Server 4500 must have GuardianOS v2.6 or higher installed to interoperate with the Snap Disk 10.

The Snap Disk 30SA

The Snap Disk 30SA expansion array works only with a Snap Server 15000 head unit or Snap Server 18000. You can daisy chain up to seven Snap Disk 30SAs via optical and copper fibre channel cables. Each expansion array holds 16 disk drives.

A Snap Disk 30SA expansion array is connected to the network and managed though the Snap Server to which it is connected. The expansion array has no physical connection to the network or independent IP address. After the Snap Disk 30SA is installed and powered on (see the quick start guide for details), the array's disk drives appear as unassigned drives, allowing the administrator to configure RAIDs as necessary.

Preparing the Snap Server 15000

The Snap Server 15000s ships with an expansion array and no additional hardware or preparation is required for connectivity.

Preparing the Snap Server 18000

Some Snap Server 18000s ship with a fibre channel card installed for connectivity to Snap Disk 30 expansion arrays. If your server already has the fibre channel card, no

further preparation (other than preparing rack space) is necessary; the Snap Disk 30SA comes with the necessary cables. Otherwise, you will need to purchase and install the Snap Appliance fibre channel card, available from an authorized Snap Appliance reseller.

The Snap Disk 32SA

The Snap Disk 32SA expansion array works with a Snap Server 15000 or 18000. You can daisy chain up to seven Snap Disk 32SAs via optical cables. Each expansion array holds up to 16 disk drives.

A Snap Disk 32SA expansion array is connected to the network and managed though the Snap Server to which it is connected. The expansion array has no physical connection to the network or independent IP address. After the Snap Disk 32SA is installed and powered on (see the quick start guide for details), the array's disk drives appear as unassigned drives, allowing the administrator to configure RAIDs as necessary.

Preparing the Snap Server 15000

The Snap Server 15000s ships with an expansion array and no additional hardware or preparation is required for connectivity.

Preparing the Snap Server 18000

Some Snap Server 18000s ship with a fibre channel card installed for connectivity to Snap Disk 32SA expansion arrays. If your server already has the fibre channel card, no further preparation (other than preparing rack space) is necessary; the Snap Disk 32SA comes with the necessary cables. Otherwise, you will need to purchase and install the Snap Appliance fibre channel card, available from an authorized Snap Appliance reseller.

Managing Expansion Array Storage

The four disk drives of a Snap Disk 10 are preconfigured as a RAID 5 with a single volume and a single share to the volume. The 16 disk drives of the Snap Disk 30SA and Snap Disk 32SA are not preconfigured but are shipped as unassigned disk drives, allowing administrators to configure the array as appropriate.

Once connected to and integrated into the host Snap Server, the Snap Disk 10's storage configuration appears as an additional RAID, volume, and share in the host server's Administration Tool. For example, if the host server retains the default storage configuration and names (md0, VOL0, SHARE1), an array will appear in the host server's Administration Tool as md1, VOL1, and SHARE2. The disk drives of any attached Snap Disk 30SAs and Snap Disk 32SAs appear in the Administration Tool as unassigned drives.

On the **Storage > Devices** screen, an expansion array's disk drives are distinguished from those of the host server by the label EXTN. The following graphic shows the Devices screen of a host Snap Server 4500. The disk drives of the expansion array connected to Port 1 of the host server's Serial ATA card display with the label EXTN1; the disk drives of a second expansion array connected to Port 2 display with the label EXTN2. With multiple Snap Disk 30SAs or Snap Disk 32SAs, the disk drives are numbered in the order in which they are daisy chained.

The disk drives of an expansion array are completely integrated into the host Snap Server's logic. The default configurations are preconfigured as separate RAIDs, but you can delete these configurations and recombine the internal and external disk drives as necessary. For example, to create one large RAID, you could delete the existing RAIDs on both the host server and the expansion arrays, and then recombine all drives into one high-capacity storage system. This configuration reduces administrative complexity and overhead, but because the failure of any one unit in the system (due to a cable coming loose, for example) will render the entire RAID inaccessible.

Caution (1) Host server disk drives and expansion array disk drives are logically interchangeable, they are not physically interchangeable. That is, you cannot physically take a disk drive from an expansion array and place it in a host Snap Server. Snap Server disk drives contain GuardianOS-specific data that is lacking on expansion array disk drives. (2) Do not mix drives of different capacity in a RAID 1 or 5. The redundancy schemes in these RAID types limit capacity usage in all member drives to the capacity of the smallest member disk drive. For example, if a RAID consists of one 116 MB disk drive and three 237 MB disk drives, the RAID can use only 116 MB on each disk drive. In this case, the total RAID capacity is approximately 464 MB (4 x 116) rather than the expected 827 MB (116 + [3 x 237]).

Status Devices

To view the status of the disk drives installed on the server, navigate to the **Storage > Devices** screen. If the system consists of a single Snap Server, a Disk Drive Detail screen displays. If the system consists of a Snap Server 4500 or 15000 and one or more expansion arrays, an enclosure summary screen displays, with links to the Disk Drive Detail screen for each enclosure.

The Disk Drive Detail Screen

If the system consists of a single Snap Server, a Disk Drive Detail screen displays.

Understanding the Disk Drive Detail table

The table displays the location, model, actual capacity, and status of each drive.

Deleteing Unassigned Global Hot Spares

Label	Description
Location	The bay in which the drive is seated
Model	Device specifications
Size	Actual available capacity
Status	Current condition of the device: • *Member Of* — The RAID to which the drive is assigned. • *Unassigned* — Not a member of any RAID. • *Hot Spare of* — The drive is reserved as a local hot spare and is available only the RAID of which it is a member. • *Global Hot Spare for* — The drive is reserved as a hot spare for the named RAIDs. • *Failed* — The drive is offline or otherwise inaccessible. • *Drive not present* — The drive slot does not contain a drive. **Tip** In the Status column, you can click the name of a RAID to view the RAID's configuration.

When a RAID set is deleted and an unassigned global hot spare is still displayed in the Devices screen, click the 'none' link next to the unassigned global hot spare. Follow the on-screen instructions to delete the hot spare.

The Enclosure Summary Screen

If the system consists of a Snap Server 4500, 15000, or 18000 and one or more expansion arrays, an enclosure summary screen displays, with links to the Disk Drive Detail screen for each enclosure.

Identifying Enclosures

Disk drives internal to a Snap Server and those belonging to attached expansion enclosures are distinguished as follows:

- On a Snap Server 4500, any attached Snap Disk 10 expansion array disk drives are distinguished from those of the host server by the label EXTN1 (if attached to Port 1 of the host server's Serial ATA card) and EXTN2 (if connected to Port 2).
- On a Snap Server 15000 or 18000, the disk drives of the Snap Disk 30SA that is directly attached to the Snap Server is distinguished from those of the host server by the label EXTN1. Additional attached expansion arrays are labeled sequentially EXTN2, EXTN3) according to their position in the daisy chain.

Understanding the Disk Drive Detail table

This screen displays summary information on each enclosure in the system as follows:

Label	Description
Snap Unit	The bay in which the drive is seated
Model	Snap Server or Snap Disk Model Number
Server Number	Server number
Drives	The number of disk drives
Status	Current condition of the unit's disk drives. Click the unit name for details: • *All Drives OK* • *One or more drives missing* • *One or more drives failed*

To view detailed disk drive information

Do one of the following:

- For a single enclosure, select the name of the Snap Server Unit.
- For multiple enclosures, check the enclosures and select **View Drives**.

iSCSI Disks

Internet SCSI (iSCSI) is a standard that defines the encapsulation of SCSI packets in TCP and their transmission via IP. On Snap Servers, an iSCSI Disk is based on an expandable, RAID-protected volume but appears to a client machine as a local SCSI drive. This storage virtualization frees the administrator from the physical limitations of direct-attached storage media and allows capacity to be expanded easily as needed. Unlike standard Snap Server volumes, Snap Server iSCSI Disks can be formatted by the iSCSI client to accommodate different application requirements.

iSCSI Disks are created on the **Storage > iSCSI** screen of the Administration Tool. Snap Appliance has qualified a number of software initiators, TOE cards (TCP/IP Offload Engines), and drivers to interoperate with Snap Server iSCSI Disks. See the iSCSI Support page on our website for the latest information on third-party software and hardware, including information on the following:

- Supported versions and models
- Known Restrictions on the iSCSI functionality imposed by each product
- Download, installation, and configuration information

Topics in iSCSI Disk Configuration:

- iSCSI Disk Management and Usage

iSCSI Disk Management and Usage

iSCSI Disks are created on the **Storage > iSCSI** screen of the Administration Tool. Snap Appliance has qualified a number of software initiators, TOE cards (TCP/IP Offload Engines), and drivers to interoperate with Snap Server iSCSI Disks. See the iSCSI Support page on our website for the latest information on third-party software and hardware, including information on the following:

- Supported versions and models
- Known Restrictions on the iSCSI functionality imposed by each product
- Download, installation, and configuration information

Isolate iSCSI Disks from Other Resources for Backup Purposes

It is important to isolate iSCSI Disks from other resources on the Snap Server for two reasons: (1) the file system of an iSCSI Disk differs fundamentally from the Snap Server's native file system; and (2) iSCSI Disks are managed from client software rather than the Snap Server's Administration Tool. For ease of management and particularly for data integrity and backup purposes, either dedicate the entire Snap Server to iSCSI Disks, or if the server is to be used with other shared resources, place the iSCSI Disk and the other shared resources on separate volumes.

- **Backup an iSCSI Disk from the Client, not the Snap Server —** An iSCSI Disk is not accessible from a share and thus cannot be backed up from the Snap Server. The disk can, however, be backed up from the client machine from which the iSCSI Disk is managed.

  Tip While some third-party, agent-based backup packages could *technically* back up an iSCSI Disk on the Snap Server, the result would be inconsistent or corrupted backup data if any clients are connected during the operation. Only the client can maintain the file system embedded on the iSCSI disk in the consistent state that is required for data integrity.

- **Do not use snapshots on a volume containing an iSCSI Disk —** Running a snapshot on a volume containing an iSCSI Disk will abruptly disconnect any clients attempting to write to the server's iSCSI Disk and the resulting snapshot may contain inconsistent data.

iSCSI Multi-Initiator Support

The Support Multi-Initiator checkbox allows two or more initiators to simultaneously access a single iSCSI target. Multi-Initiator Support is designed for use with applications or environments in which clients coordinate with one another to properly write and store data on the target disk. An environment such as clustering avoids potential data integrity issues. Data corruption becomes possible when multiple initiators write to the same disk in an uncontrolled fashion.

The warning message "Uncontrolled simultaneous access of multiple initiators to the same iSCSI target can result in data corruption. Only enable multi-initiator support if your environment or application supports it." occurs when the checkbox for Support Muli-Initiator is selected. It functions as a reminder that data corruption is possible if this option is used when creating an iSCSI disk.

Write-Cache Options with iSCSI Disks

To ensure the fastest possible write performance, Snap Servers can buffer up to 1GB of data to efficiently handle data being transmitted to a Snap Server. As every administrator knows, this widely accepted method of improving performance is not

without some risk. If the Snap Server were to suddenly lose power, for example, data still in cache would be lost.

This risk can be minimized by following industry-standard security precautions such as keeping servers in a secured location and connecting power supplies to the mains using a network-based UPS. In most environments, taking these simple precautions virtually eliminates the risk of serious data loss from sudden and unexpected power outages.

Of course, the physical conditions and company policies that guide IT decisions vary widely. Power outages are a common occurrence in some areas, and data protection procedures vary from company to company. Administrators who determine that the risk of data loss, even with security cautions in place, outweighs the significant increase in write performance that write-cache provides, can disable this feature for individual iSCSI Disks.

Tips (1) Write-cache can be disabled on an iSCSI Disk-by-iSCSI Disk basis. Disabling write-cache for an iSCSI Disk does *not* disable write-cache for any other iSCSI Disk or any other resources on the Snap Server; (2) The opportunity to enable/disable write-cache for an iSCSI Disk occurs only when the disk is created; it cannot be toggled at a later date; (3) Disabling write-cache for an iSCSI Disk does not eliminate *all* potential risk of data loss due to an unexpected loss of power as each disk drive contains its own internal cache of 8MB or more.

Disconnect iSCSI Disk Initiators before Shutting Down the Server

Shutting down the server while a client initiator is connected to an iSCSI Disk appears to the client initiator software as a disk failure and may result in data loss or corruption. Make sure any initiators connected to iSCSI Disks are disconnected before shutting down the server.

Ignore the *Volume is Full* Message

When an iSCSI Disk is created, the volume allocates the specified capacity to the disk. If all volume capacity is allocated to the iSCSI Disk and e-mail notification is enabled, the Snap Server may generate a *Volume is Full* message. This message indicates only that the volume capacity is fully allocated to the iSCSI Disk and is not available to other resources. To determine the status of iSCSI Disk storage utilization, use the tools provided on the client machine.

To Configure iSNS

Label	Description
iSCSI Disk Name	The name of each iSCSI disk
Volume	The volume on which the iSCSI disk was created
Device	The path of the iSCSI disk file
Authentication	CHAP or none
Size	The size of the iSCSI disk
Status	Current condition of the iSCSI disk: • *OK* — The iSCSI disk is online and accessible. • *Not Mounted* — The iSCSI disk is offline.

Click the **Configure iSCSI** link in the upper right of the screen to jump to the **Network > iSCSI** screen, from which you can configure iSNS.

To Edit an iSCSI Disk

Click an iSCSI Disk name. You can increase (but not decrease) its size.

To Delete an iSCSI Disk

The system will not allow the deletion of an iSCSI Disk when clients are connected. After disconnecting all client initiators, click **Delete**, and then follow the onscreen instructions to delete one or more iSCSI disks.

Share and File Access

Snap Appliance has implemented features to accommodate the disparate methods used by the SMB and NFS protocols for sharing data. At the share level, administrators can assign read-write or read-only share access to individual Windows (and local) users and groups. Administrators can also edit the NFS *exports* file to control how shares are exported to NFS client machines.

The SMB and NFS protocols also part ways in their handling of file-level permissions. Administrators can choose to apply Windows or UNIX-style file-level permissions to entire volumes or to directories at the root of a volume (aka SnapTree directories). These security-based directory structures are referred to as SnapTrees. Files permissions in a Windows SnapTree are set from a Windows client; in a UNIX SnapTree, they are set from an NFS client.

Topics in Share Access and File Permissions

- Components and Options
- SnapTrees & Security Models
- Creating Shares
- Share-Level Access Permissions
- Setting File and Folder Permissions (Windows)

Components and Options

Shares are created and share access is granted using the Administration Tool. File-level permissions are configured from a Windows or UNIX/Linux workstation. The following table summarizes the components, options, and tools available for setting up share and file security on Snap Servers.

Component	Options
Security Models (SnapTrees)	Directories created on the root of a Snap Server volume are assigned one of two security models: Windows or UNIX. The security model determines the file-level security scheme that will apply to files, folders, and subdirectories within the directory (aka SnapTree directory). This security-based directory structure is referred to as a SnapTree.
Shares	Shares are created on the **Storage > Shares** screen. When creating a share, you must set the following options: • **Share Mount Point**: In the course of creating a share, you can either select an existing directory or create a new one. • **Security Model**: If you create a share pointing to a volume or a SnapTree directory, a security model must be selected. • **Protocol Access**: Client access to the share can be restricted to specific protocols. As a security precaution, disable any protocols not needed by users of the share.
Share Access	Share-level access allows users/groups/clients to connect to a share and is configured from the **Security > Share Access** screen. • **User and Group Access**: Users and groups known to the system can be given read-write or read-only access to the share. • **NFS Client Access**: The Administration Tool provides a window into the *exports* file for defining how a share is exported to NFS clients. • **Hidden Shares**: The Hidden option allows you to hide a share from clients connecting from the SMB, HTTP, AFP, FTP (but not NFS) protocols.
File Permissions	File-level permissions define what actions users and groups can perform on files and directories, and are set from a Windows client for a Windows SnapTree; and from a UNIX/Linux client for a UNIX SnapTree.

SnapTrees & Security Models

Directories created at the root of a Snap Server volume are assigned one of two security models: Windows or UNIX. The security model determines the file-level security scheme that will apply to files, folders, and subdirectories within the top-level directory. This security-based directory structure is referred to as a SnapTree.

- **Creating a SnapTree Directory —** SnapTree directories are created either from the **Security > SnapTree** screens in the Administration Tool or from a client machine. Using the SnapTree screens, you can assign either security model at creation time. (The default is Windows.) Directories created from a client adopt the security model of its parent volume or SnapTree directory.

  Tip A SnapTree directory can also be created and a security model assigned in the course of creating a share.

- **Toggling Security Models —** The security model applied to a volume or SnapTree directory can be changed only from the **Security > SnapTree** screens.

Caution Do not use spaces in naming a directory that is to serve as a share point. The GuardianOS will recognize the directory, but it will not be available for use as a mount point. Instead, use the underscore character to separate terms in a directory name.

SnapTree Functionality

Function	Description
SnapTree Directory Ownership	Default ownership differs according to the method used to create the SnapTree directory: • **From the client —** The logged-on user will be the user owner of the directory, and the logged-on user's primary group will be the group owner of the directory. • **From the Administration Tool** — The user owner of the SnapTree will be the admin account, and the group owner will be admin group (admingrp).
Security Model Inheritance	A volume is assigned a security model, and new directories created at the root of the volume default to that security model. Files and directories created below a SnapTree directory default to its security model.
Toggling Security Models	You can change the security model for an individual volume, an individual SnapTree, or for a volume and all the SnapTrees it contains.
Mixing SnapTrees	You can create SnapTrees of different security models on the same volume.

Creating Shares

Shares are created, viewed, edited, and deleted from the **Storage > Shares** screen of the Administration Tool. The default share (SHARE1) maps to the root of the volume and grants access to all users and groups over all protocols. As a security measure, disable any protocols not required for your network environment.

Guidelines

Consider the following guidelines when creating or deleting shares.

Maintain at Least One Share at the Root of Each Volume

A share to the root of a volume is required for backup purposes. Security for any share at the root of the volume should be given special consideration. Any user or group that has access to the root of a volume will have access to EVERY file and subdirectory on that volume unless there is a specific ACL in place precluding that access. In general, access to a share at the root of a volume should only be granted to a system administrator or backup operator.

Hidden Shares

A *hidden* share is hidden from clients connecting from the SMB, HTTP, AFP, and FTP (but not NFS) protocols. For example, assume SHARE1 is set as hidden. Windows users will not see the share when viewing the server through Network Neighborhood, or when performing a `net view \\servername` on the Snap Server.

Tip Windows users who have access rights to a hidden share can still access the share by entering the precise path to the share directly into their file system viewer. For example, Windows users could enter an address of the format `\\server_name\hidden_ share_name` to access a hidden share. Likewise, FTP clients will still be able to "cd" directly into the folder to which the share points if they know the precise path. This method will not work, however, for Macintosh clients, to whom a hidden share is always inaccessible.

Snapshot Shares

A *snapshot share* provides access to all current snapshots of a volume. Just as a share provides access to a portion of a live volume, a snapshot share provides access to the same portion of the file system on any archived snapshots of the volume. You create a snapshot share by selecting the *Create Snapshot Share* check box in the course of creating or editing a share.

Security Models, SnapTrees, and Shares

In the course of creating a share that points to a volume or to a directory on the root of the volume (aka SnapTree directory), you must assign a security model to the volume or SnapTree directory. Thereafter, security models for these entities are managed on the **Security > SnapTrees** screens.

Share-Level Access Permissions

Share access permissions for all client platforms are configured by navigating to the **Security > Share Access** screen and clicking a share name. When a share is created, the default permission granted to users, groups, and NFS clients is full control. You can restrict selected users and groups to read-only access; and you can specify how the share will be exported to NFS clients.

Share-Level Access Permissions and Attributes		
Read-only	R	Users can navigate the share directory structure and view files.
Full control	RW	Users can read, write, modify, create, or delete files and folders within the share.
Hidden	H	The share is hidden in Web View to clients accessing the server over the SMB, HTTP, AFP, and FTP (but visible to NFS) protocols.
Invalid	B	Path invalidation is most commonly caused by deleting or renaming the directory to which the share points. To remedy this situation, restore the original path as shown in the Path column of the table or remap the share.

Share Access Behaviors

Administrators tasked with devising security policies for the Snap Server will find the following share access behaviors of interest:

- **Share access defaults to full control —** The default permission granted to users and groups when they are granted access to the share is full control. You may restrict selected users and groups to read-only access.
- **Share access permissions are cumulative —** A user's effective permissions for a resource are the sum of the permissions that you assign to the individual user account and to all of the groups to which the user belongs. For example, if a user has read-only permission to the share, but is also a member of a group that has been given full-access permission to the share, the user gets full access to the share.

- **Interaction between share-level and file-level access permissions —** When both share-level and file-level permissions apply to a user action, the more restrictive of the two applies. Consider the following examples:

  Example A: More restrictive file-level access trumps more permissive share-level access.

Share Level	File Level	Result
Full control	Read-only to FileA	Full control over all directories and files in SHARE1 *except* where a more restrictive file-level permission applies. The user has read-only access to FileA.

  Example B: More restrictive share-level access trumps more permissive file-level access.

Share Level	File Level	Result
Read-only	Full control to FileB	Read-only access to all directories and files in SHARE1, *including* where a less restrictive file-level permission applies. The user has read-only access to FileB.

The NFS Warning Message

The Administration Tool displays a warning that security settings for a share may not apply to NFS clients when all of the following criteria are met:

- Access to the server via NFS is enabled
- Access to the share via NFS is enabled
- The AllUsers group is not given full access

Setting File and Folder Permissions (Windows)

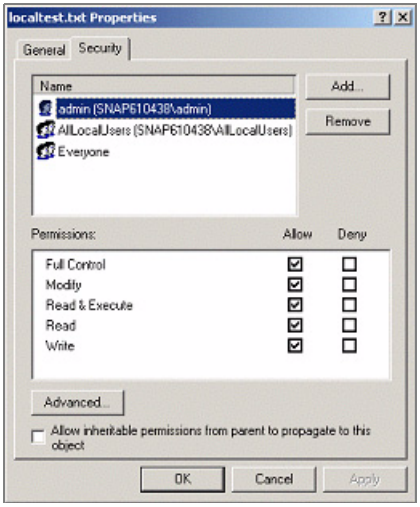
On files and directories following the Windows security model, the GuardianOS supports the use of the Windows NT, 2000, or XP interface to set directory and file permissions for local and domain/ADS users and groups on the Snap Server. On a directory, administrators can also set inheritance permissions that will be inherited by subordinate folders and files created within the directory.

Default File and Folder Permissions

When a file or directory is created, the GuardianOS grants access to the accounts listed in the following table. Access permissions for each account are inherited from

the parent directory. The example displayed in the graphic shows the default settings for a file created by the local user *admin*.

File/Directory-Level Access Permissions	
User owner	Initially, the user who created the file or directory
Group owner	The primary group of the user who created the file or directory
Everyone	Includes users to whom no other permission applies



- **The default permissions cannot be deleted —** You can delete the everyone permission, but the GuardianOS does not allow you to delete the user owner or group owner. You can, however, modify the permissions for these accounts as described below.
- **Ownership is set when the file or folder is created —** The user account under which a file or folder is created becomes the owner of the file or folder. This user's primary group becomes the group owner of the file or folder.
- **The primary group of NT 4.0 or AD domain users is specified on the domain controller —** For local users, the primary group is AllLocalUsers. For Windows domain users, the primary group can be set on a Windows domain controller. (This setting is purely for compatibility with the GuardianOS security and is not significant in Windows security.)
- **The user owner always has change permissions access —** Regardless of file-level access settings, a user owner has change permissions access to files and directories.

Setting File and Directory Access Permissions and Inheritance (Windows)

Access permissions for files and directories using the Windows security model are set using Windows NT, 2000, or XP security tools, but not all the options available

in Windows security are available on the Snap Server. The GuardianOS supports the following file and directory permissions.

File- and Directory-Level Access Permissions	
Read	Grants complete read access. It is a combination of List Folder/ Read Data, Read Attributes, Read Extended Attributes, Read Permissions.
Write	Grants complete write access. A combination of Create Files/Write Data, Create Folders/ Append Data, Write Attributes, and Write Extended attributes.
Execute	(UNIX and MacOS X only) Allows programs and scripts to run.
Delete	Grants the user the permission to delete the file/directory.
Change Permissions	Grants the user rights to modify the permissions (ACLs) on the file/ directory.
Take Ownership	Take Ownership gives the user the ability to take ownership of the file/ directory.

You can also set inheritance for a directory such that subfolders and files created under the directory inherit a set of permissions. This inheritance should propagate to subordinate files and folders at creation time once inheritance is set. The GuardianOS supports three levels of inheritance, as listed in the following table. The other six levels of inheritance available in Windows are not supported and will not work against a Snap Server.

Supported Inheritance Settings	
This Folder	Permissions will be applied only to the current directory and will not be inherited by subfolders or files.
Subfolders and Files	Permissions will be inherited by subfolders and files but will not be applied to the current directory.
This Folder, Subfolders, and Files	Permissions will both be applied to the current directory and inherited by subfolders and files.

To Set File and Directory Permissions and Inheritance (Windows)

1. Using a Windows NT 4.0, 2000, or XP client, map a drive to the Snap Server, logging in as a user with change permissions for the target file or directory.
2. Do one of the following:
   - In Windows NT, right-click the file or directory, choose **Properties**, click the **Security** button, and then select **Permissions**.
   - In Windows 2000, right-click the file or directory, choose **Properties**, and then select the **Security** tab.
3. Use the Windows security tools to add or delete users and groups, to modify their permissions, and to set inheritance rules.

How the GuardianOS and Windows Differ in Processing File-Level Access Permissions

The GuardianOS processes access permissions differently than does the Windows operating system, allowing administrators finer granularity in devising a file access strategy. When a user attempts to perform an action on a file and directory, Windows collects all permissions that apply to the user before deciding whether to allow the user to perform the action. The GuardianOS, on the other hand, uses the first applicable permission it finds to decide whether to allow the user to perform the action. The GuardianOS searches for access permissions in the following order:

```
1. User owner 2. User 3. Group owner 4. Group 5. Everyone
```

When a match is found, the search stops and the specified access permission is applied. Assume the user *joan brown* is attempting to modify the file *settings.doc*. Joan brown is a member of the group *sales*. As a user, *jbrown* has read-only access to the file; the group *sales* has read-write access to the file, as follows:

```
settings.doc: username:jbrown:RO; groupname:sales:RW
```

The following table shows how Windows and the GuardianOS treat these settings:

Type	Access	Windows	GuardianOS
jbrown	Read-only	Match found for *jbrown*, read access found, continue searching for necessary access	Match found for user *jbrown*, stop searching and prevent user from modifying file
sales	Read-write	Match found for group *sales*, read-write found, allow user *jbrown* to modify the file	

In this case, Windows would grant write access to Joan Brown, allowing her to modify the file. The GuardianOS, on the other hand, would not allow Joan Brown to modify the file.

Snapshots

A *snapshot* is a consistent, stable, point-in-time image of a volume used for backup purposes. Snapshots can satisfy short-term backup situations such as recovering a file deleted in error, or even restoring an entire file system, without resorting to tape. Perhaps more importantly, snapshots can be incorporated as a central component of your backup strategy to ensure that all data in every backup operation is internally consistent and that no data is overlooked or skipped.

Topics in Snapshot Management:

- Snapshot Management and Usage
- Estimating Snapshot Pool Requirements
- Adjusting Snapshot Pool Size
- Accessing Snapshots
- Coordinating Snapshot and Backup Operations

Related Information:

- Isolate iSCSI Disks from Other Resources for Backup Purposes

Snapshot Management and Usage

This section describes snapshot components and dependencies.

The Snapshot Pool

Snapshot data are stored on a RAID in a *snapshot pool*, or space reserved within the RAID for this purpose. Each RAID on the system contains only one snapshot pool. This pool contains all snapshot data for all volumes on the RAID. For more information, see “Estimating Snapshot Pool Requirements” on page 57.

Rolling a Volume Back to a Previous State

If you need to restore an entire file system to a previous state, you can do so without resorting to tape. The snapshot rollback feature allows you to use any archived snapshot to restore an entire file system to a previous state simply by selecting the

snapshot and clicking the **Rollback** button. During the rollback operation, data on the volume will be inaccessible to clients.

Cautions (1) Rolling back a volume cannot be undone and should only be used as a last resort after attempts to restore selected directories or files have failed; (2) Performing a rollback on a volume may invalidate the NetVault for GuardianOS nvdb directory for the volume, and may also disable the antivirus software. If you are using these features, take the necessary precautions as described in "Volumes" on page 33.

Scheduling Snapshots

Snapshots should ideally be taken when your system is idle. It is recommended that snapshots be taken before a backup is performed. For example, if your backup is scheduled at 4am, schedule the snapshot to be taken at 2am, thereby avoiding system activity and ensuring the snapshot is backed-up. See "Coordinating Snapshot and Backup Operations" on page 59 for more information.

Snapshots and Backup Optimization

When you back up a live volume directly, files that reference other files in the system may become "out-of sync" in relation to each other. The more data you have to back up, the more time is required for the backup operation, and the more likely these events are to occur. By backing up the snapshot rather than the volume itself, you greatly reduce the risk of archiving inconsistent data. For instructions, see "Coordinating Snapshot and Backup Operations" on page 59.

NDMP and Snapshots

A snapshot is automatically initiated by this type of backup operation. Administrators backing up via NDMP should consider the following:

- When files and directories on a Windows SnapTree are backed up and restored to a UNIX SnapTree, extended Windows attributes and file ownership are not preserved.
- If the snapshot pool does not have sufficient space to fire an additional snapshot, it will remove the oldest snapshots to create the space required.
- NDMP backup jobs may not time out for extended periods when interrupted or the NDMP service is stopped. The DMA will continue to attempt to write data to the target device.

Snapshots and iSCSI Disks

Running a snapshot on a volume containing an iSCSI Disk will abruptly disconnect any clients attempting to write to the iSCSI Disk and the resulting snapshot may contain inconsistent data. Do not use snapshots on a volume containing an iSCSI Disk.

Estimating Snapshot Pool Requirements

Snapshot data grows dynamically for as long as a snapshot is active and as long as there is enough space available in the snapshot pool to store them. When the snapshot pool approaches its capacity (at about 95 percent), the Snap Server deletes the oldest snapshot's data to create space for more recent snapshot data.

The default configuration allocates 80 percent of RAID capacity to the volume and 20 percent to the snapshot pool. You can adjust the size of the pool up (assuming unallocated space exists) or down according to your needs. If you find that your snapshot strategy does not require all of the space allocated to the snapshot pool by default, consider decreasing snapshot pool capacity and re-allocating the capacity to the file system. To adjust the size of the snapshot pool, navigate to the **Storage > Snapshots** screen, and click the **Adjust Snapshot Space** link in the introductory text.

The number of snapshots that a RAID can support is a function of these factors: (1) the space reserved for the snapshot data; (2) the duration of the snapshots you create; and (3) the amount and type of write activity to the volume(s) since the snapshot was created. The following table describes minimum and maximum allocation cases.

Guidelines for Estimating Snapshot Pool Requirements

Allocate about 10% of RAID if	Allocate about 25% of RAID if
• Activity is write-light	• Activity is write-heavy
• Write access patterns are concentrated in a few places	• Write access patterns are randomized across the volume
• A small number of Snapshots must be available at any point in time	• A large number of Snapshots must be available at any point in time

Adjusting Snapshot Pool Size

The current size of the snapshot pool for each RAID (or RAID group) can be viewed by navigating to the **Storage > Snapshots** screen and clicking the **adjust snapshot space** link in the introductory text. On the screen that opens, you can adjust the pool up or down as necessary at any time. In addition, there are two other processes that may affect the size of the snapshot pool.

- **Creating a Volume —** In the course of creating a new volume, a pull-down menu allows you to add a percentage of the capacity being allocated to the new volume to the snapshot pool. This feature defaults to 20%, the recommended amount of space to reserve for snapshots. If you do not plan to use snapshots with this volume, maximize volume capacity by reducing this percentage to zero; if you do plan to use snapshots, adjust this percentage in accordance with the guidelines discussed in previous section.

- **Creating a RAID Group —** When two RAIDS are grouped, their snapshot pools are added together. For example, if RAID A with a snapshot pool of 50 MB is grouped with RAID B with a snapshot pool of 25 MB, the resulting RAID Group will have a snapshot pool or 75 MB. Depending on the purpose you had in mind when grouping the RAIDs, the result of combining the two snapshot pools may or may not be desirable, and you will need to readjust the size as described above.

Accessing Snapshots

Snapshots are accessed via a snapshot share. Just as a share provides access to a portion of a live volume (or file system), a snapshot share provides access to the same portion of the file system on all current snapshots of the volume. The snapshot share's path into snapshots mimics the original share's path into the live volume.

Creating a Snapshot Share

You create a snapshot share by selecting the *Create Snapshot Share* option in the course of creating a live-volume share. For example, assume you create a share to a directory called "sales," and you select the *Create Snapshot Share* option. When you connect to the server via Internet Explorer or other file browser, two shares display:

```
SALES
SALES_SNAP
```

The first share provides access to the live volume, and the second share provides access to any archived snapshots. Other than read-write settings (snapshots are read-only), a snapshot share inherits access privileges from its associated live-volume share.

Tip The same folders appear on the Web View screen when you connect to Snap Server using a Web browser; however, the snapshot share folder does not provide access to the snapshot; it will always appear to be empty. You can prevent the snapshot share from displaying on this Web View screen by selecting the *Hide Snapshot Share* option when creating or editing a share.

Accessing Snapshots Within the Snapshot Share

A snapshot share contains a series of directories. Each directory inside the snapshot share represents a different snapshot. The directory names reflect the date and time the snapshot was created. For example, assume the snapshot share named *Sales_SNAP* contains the following four directories:

```
latest
2003-12-25.120000
2004-01-01.000100
2004-01-07.020100
```

The *latest* directory always points to the most recent snapshot (in this case, `2003-01-07.020100`, or January 7th, 2003, at 2:01 a.m.). A user may view an individual file as it existed at a previous point in time or even roll back to a previous version of the file by creating a file copy to the current live volume.

Tip The "latest" subdirectory is very useful for setting up backup jobs as the name of the directory is always the same and always points to the latest available snapshot.

Coordinating Snapshot and Backup Operations

Like backups, snapshots can be scheduled to recur at a designated time and interval. In addition to synchronizing the backup and snapshot schedules, you must create a share (and snapshot share) to the appropriate directory so that the backup software can access the snapshot. For most backup purposes, the directory specified should be one that points to the root of the volume so that all of the volume's data is backed up and available from the snapshot share.

1 **Create a snapshot for each volume you want to back up.**

In the Administration Tool, navigate to the **Storage > Snapshots** screen, and click **Create Snapshot**. When defining and scheduling the snapshot, consider the following:

- In the Create Recovery File pull-down menu, select *Yes* to ensure that the ACL, extended attributes, and quota information is captured and appended to the snapshot. This step is needed because many backup packages do not back up native ACLs and quotas. Placing this information in a recovery file allows all backup packages to include this information. If the volume needs to be restored from tape, or the entire system needs to be recreated from scratch on a different server, this information may be required to restore all rights and quota information.
- Offset the snapshot and backup schedules such that the backup does not occur until you are sure the snapshot has been created. (The snapshot itself does not require much time, but creating the recovery file may take up to 30 minutes,

depending on the number of files in the volume.) For example, assuming you schedule nightly backups for a heavily used volume at 3:00 a.m., you might schedule the snapshot of the volume to run every day at 2:30 a.m., allowing half an hour for the snapshot to run to completion.

2 **If necessary, create a share for each volume with snapshot share enabled.**

In the Administration Tool, begin by navigating to the **Security > Shares** screen, and then click **Create Share**. Select the volume and click **Continue**. Then, to create a share to the volume itself (on the root), simply accept the default path by clicking **Use Current Path**. Finally, be sure to select *Create Snapshot Share*.

3 **Set the backup software to archive the latest version of the snapshot.**

The Snap Server makes it easy to configure your backup software to automatically archive the most recent snapshot. Simply configure your backup software to copy the contents of the `latest` directory within the snapshot share you created at the root of the volume. For example, assume the snapshot share named *SHARE1_SNAP* contains the following four directories:

```
latest
2003-12-25.120000
2004-01-01.000100
2004-01-07.020100
```

Each directory inside the snapshot share represents a different snapshot. The directory names reflect the date and time the snapshot was created. However, the `latest` directory always points to the latest snapshot (in this case, `2003-01-07.020100`, or January 7th, 2003, at 2:01 a.m.). In this case, configuring the backup software to copy from

```
\SHARE1_SNAP\latest
```

ensures that the most recently created snapshot is always archived.

Disaster Recovery

This chapter explains how to create the files you need to recover a Snap Server's configuration information, such as network and RAID configurations, as well as volume-specific information, such as ACLs and quota settings.

It also discusses what to do if all access to the data on a Snap Server is cut off due to a hardware or software failure. Focus is placed on the procedures for (1) reinstalling the Snap Server operating system; and (2) restoring the server to its original configuration with data intact. The final section describes how to use these files to restore any Snap Server to its original state.

Topics in Disaster Recovery Management:

- Backing Up Server and Volume Settings
- Backing Up the NetVault for GuardianOS NVDB Directory
- Recovering the NetVault Database
- Disaster Recovery Procedural Overview

Backing Up Server and Volume Settings

In addition to backing up the data stored on the Snap Server, you may also back up its system and volume settings. The **Maintenance > Disaster Recovery** screen allows you to create the files you need to restore these settings: (1) server-specific settings such as server name, network, RAID, volume and share configurations, local user and group lists, and snapshot schedules; and (2) volume-specific settings such as ACLs, extended attributes, and quota settings.

The SnapDRImage File and the Volume Files

Details on the Snap Server disaster recovery files and the information they contain are as follows:

- **SnapDRImage —** The Snap Server disaster recovery image saves server-specific settings such as server name, network, RAID, volume and share configuration, local user and group lists, and snapshot schedules. There is one SnapDRImage file per server, residing on the root directory of the first volume at the following path: *\\server_name\volume_name*.

  Tip The SnapDRImage file is in binary form and can be safely used only with the Snap Server Disaster Recovery tool. Other tools will not work and may compromise the integrity of the file.

- **Volume-specific files —** These files, named *backup.acl*, *backup.qta.groups*, and *backup.qta.users*, preserve volume-specific settings such as ACLs, extended attributes, and quota settings. One set of these files exists per volume, residing at the following path: *server_name**volume_name*\.os_private.

  Caution The Create Recovery Files option in the snapshot feature automatically updates the volume-specific files when the snapshot is taken. If you do not use snapshots to back up a volume to tape, you must manually regenerate these files whenever you change ACL or quota information to ensure that you are backing up the most current volume settings.

Creating the SnapDRImage and Volume Files

Before you create the disaster recovery files, make sure you have completed the following activities:

- You have completely configured the Snap Server. If you subsequently make any major changes to the configuration, you must repeat the procedures described in this section.
- You have recorded, in an off-server location, the following information about the configuration: (1) the server name; (2) the number of RAIDs; (3) the number of volumes; and (4) the size of each volume. You may need to enter this information later as part of a disaster recovery operation.
- You have devised and implemented a data backup strategy.

Use the following procedure to create and secure the disaster recovery files:

1. **Create the disaster recovery files.**

   Navigate to the **Maintenance > Disaster Recovery** screen. Click **Create Recovery Images** to create the SnapDRImage file and the volume files in a single operation.

2. **Copy the files to a safe place off the server.**

   Copy the SnapDRImage file to a safe location on another server or backup medium. (See the previous section for file names and paths.) This strategy ensures that if the file system on the Snap Server is corrupted, the image file will be available to restore server settings.

3 **Take no action regarding the volume-specific files.**

These files will be copied to tape as part of your regular volume backup procedures.

Backing Up the NetVault for GuardianOS NVDB Directory

This section details the use of the NetVault Database plug-in and offers various tips for its use.

Backup Recommendations

It is important to note that the NetVault Database can be backed up at any time as long as no other NetVault jobs controlled by this server are running. With this in mind, the following points are recommended when backing up the NetVault Database:

- **Perform Regular Backups —** The data contained in the NetVault Database is integral to NetVault operations, but it also frequently changes as NetVault functions; therefore, it is recommended that frequent, regular backups of the NetVault Database be performed (e.g., daily, once all other backups have completed).
- **Target Specific Media for a NetVault Database Backup —** In the event that the NetVault Database needs to be recovered, the specific piece of media targeted can be easily located to perform the recovery.

To Backup the NVDB Directory

1 From the NetVault Server (either locally or remotely), open the NetVault Backup window by clicking the **Backup** button on the command toolbar. The NetVault Backup window displays the list of available clients in the Selections tab.

2 Right-click the NetVault Server (acting as a client to itself) and select **Open** from the pop-up menu.

3 The available plug-ins will be displayed. Right-click the NetVault Database Plug-in and select **Open** from the pop-up menu that appears.

4 A single selectable item will be revealed: the NetVault Database. Select the check box to the left of this item.

Tip There are no Backup Options available for use with this plug-in.

5 The remaining tab selections (Schedule, Target Advanced Options) contain additional options that can be set as desired.

6 Enter a suitable name for the job in the Job Title box and start the backup job by clicking the Submit button on the command toolbar.

Tip Only clients successfully added via the NetVault Client Management window will display.

Recovering the NetVault Database

This section summarizes the procedure necessary for recovering the NetVault Database from tape. For instructional details, see the NetVault for GuardianOS documentation that shipped with your Snap Server.

Pre-Restore Requirements

Before restoring the database, perform the following steps on the Snap Server acting as the NetVault Server:

1 Completely re-install and configure the same version of the GuardianOS that the server was running. The OS installation will also reinstall the NetVault Server software.

2 If necessary, navigate to the **Maintenance > Add-On Features** screen and re-enable the NetVault for GuardianOS software.

3 Remove all media from the device(s) used by the NetVault Server except the media that contains the backup saveset needed for the recovery of the NetVault Database.

4 Add all devices previously added to the NetVault Server through the use of the Device Management window.

5 From the Device Management window, the media containing the backup saveset will be recognized as FOREIGN in its designated drive or library slot. Scan the media before proceeding with the restore operation.

Restore Recommendations

The following recommendations are offered for the process of recovering the NetVault Database:

- **Perform a Full Recovery of the NetVault Database —** Although NetVault offers provisions for recovering individual elements of the NetVault Database, it is recommended that a full recovery be performed. If recovering individual components, it is strongly recommended that this be performed under the guidance of NetVault Technical Support.

- **Do Not Monitor Job Progress During a Recovery —** It is strongly recommended that all NetVault windows be closed, and the NetVault GUI be closed during the recovery of the NetVault Database, as this may interfere with the process.

Restore Procedure

1. Access the Restore window from the NetVault GUI by clicking the **Restore** button in the command toolbar.
2. Double-click the NetVault Server that the desired backup was performed from to open it.
3. Plug-ins (and APMs) used to conduct successful backups on the selected client will be displayed. Double-click the NetVault Database Plug-in to open it.
4. All of the Backup Savesets created using the NetVault Database Plug-in display. Locate the desired saveset, right-click it and select **Open** from the pop-up menu.
5. All of the various components that make up the NetVault Database will display. Items with check boxes at their left are single items that can be selected for inclusion, while items without check boxes can be double-clicked to browse their individual contents.
6. For a full database restore, select each item in the tree. Additionally, open up root items to display their contents by double-clicking them, and then select all of their contents (e.g., Events, Notification and Reports Database items).
7. Select the Restore Options tab and make sure that the Blank Reports Database Table option is selected.
8. Other tab selections (e.g. Schedule and Advanced Options) contain additional options that can be set as desired.
9. Enter a suitable name for the job in the Job Title box and start the restore job by clicking the **Submit** button.
10. The job will now run and the backed-up version of the NetVault Database will be restored over the one created with the recent installation of NetVault.
11. Once the NetVault Database has restored successfully, it is necessary to restart NetVault Services via the NetVault Configurator. During the restore procedure these services are automatically stopped.

Disaster Recovery Procedural Overview

The procedures described in this section for responding to a catastrophic event are general in nature and may result in the loss of data. Should such an event actually occur, the exact procedure to follow will vary according to environmental conditions. Snap Appliance strongly recommends you contact a technical service representative before proceeding.

This section describes a worst-case scenario: (1) the operating system has failed, perhaps due to a malicious attack to the root file system, and you cannot access the server; and (2) the data has been corrupted and must be restored from tape. When you attempt to connect to the server, the Administration Tool does not appear; instead, the maintenance mode screen opens.

Maintenance Mode

You will encounter the Snap Server maintenance mode when the GuardianOS has been compromised and is in need of repair or reinstallation. Maintenance mode consists of a series of HTML screens that allow you to perform the following functions:

- **Reinstall —** Reinstalls the GuardianOS, overwriting any previous configurations, and prompts you for the SnapDRImage file
- **Upgrade/Repair —** Either upgrades the GuardianOS from one version to another, or applies the GuardianOSImage but preserves system settings.
- **Fresh install —** Reinstalls the GuardianOS, overwriting any previous configurations

Tip To install the GuardianOS, you must obtain the appropriate GuardianOSImage file. This file is available from the Snap Appliance website.

Step1: Performing a Fresh Install in Maintenance Mode

If the GuardianOS has been compromised, the initial maintenance mode screen will appear when you attempt to connect to the server. Use the following procedure to reinstall the operating system.

Caution A fresh install overwrites all data on the Snap Server. Do not perform this operation until all data-recovery attempts have been completed.

1 **Download the GuardianOSImage using one of the following methods:**

- Click **Browse** to locate and select the file locally.
- Enter a remote path (FTP, HTTP, etc.) to the file.

2 **Select the *Fresh Install* option, and click OK.**

This operation may take a few minutes. As the operation progresses, the screen reports the progress of the operation. When the operation is finished, scroll to the bottom of the screen, and click **Continue**. The Continuing Fresh Install Operation screen opens.

3 **When the Fresh Install operation is finished, click Reboot.**

Rebooting takes about three minutes, after which you can refresh the screen by clicking the **Home** icon in the upper right corner of the screen. The Enter Network Password dialog box opens.

4 **Log into the Snap Server.**

Use the default user name (*admin*) and password (*admin*).

5 **Complete the Initial Setup Wizard (see page 8).**

Make sure to enter the original server name, and then reboot the server.

Step 2: Validating the Original RAIDs and Volumes

Before you can restore data from tape, verify that your RAIDs and volumes mount successfully and have not been compromised. If the original configuration is intact and accessible, skip to the next step. Otherwise, you must re-create RAIDs or volumes as necessary to match the original configuration using one or more of the processes summarized below:

1 Navigate to the **Storage > RAID Sets** screen and click **Create RAID Set**. Using the screens that follow, recreate the original RAID configuration.

2 Navigate to the **Storage > Volumes** screen and click **Create Volume**. Using the screens that follow, recreate the original volume configuration.

3 Navigate to the **Storage > Shares** screen and click **Create Share**. Using the screens that follow, recreate the original share configuration.

Step 3: Restoring the Data from Tape

If you are using NetVault for GuardianOS, you must restore the nvdb directory to the first volume before proceeding to restore data from tape. (For instructions, see “Backing Up the NetVault for GuardianOS NVDB Directory” on page 63.) Users of other backup software packages may require variations in this procedure.

1 **Determine the restoration procedure for your backup software.**

Refer to your backup software’s documentation for details on the appropriate restoration procedure.

2 **Restore data using a fully qualified path to a share.**

When entering the path to the restore directory, use the following format:

`/share_name/path_to_directory`	where *share_name* is case sensitive and *path_to_directory* points to an existing directory structure.
`/Finance/Sales`	For example, entering the path shown to the left restores the data to the Sales directory on the Finance share.

Caution If you install to an invalid share or path the software will restore to the root file system. In this situation, it is possible that the GuardianOS may be compromised and you may need to repeat the fresh install procedure.

3 **Restart the server.**

Step 4: Recovering the Original Server and Volume Configurations

To restore the original configurations to the server, navigate to the **Maintenance > Disaster Recovery** screen in the Administration Tool. Two separate operations are required. They must be run sequentially. After you start any of the recovery processes, you will see the Disaster Recovery Status screen. Do not try to navigate back from this screen during the recovery process. You are restricted to this screen so that you will not interrupt the recovery.

1 **Restore server settings.**

Click **Recover Server** to open the Server Recovery screen and use the **Browse** button to locate the SnapDRImage file. Click **Recover And Reboot** to start the operation. Once the server configuration recovery operation is complete, you can start the volume configuration recovery operation.

2 **Restore volume ACL and quota configurations.**

Click **Recover Volume** to open the Server Recovery screen. Select all volumes. (Volumes that do not have a recovery file attached will appear as unavailable, and the corresponding check box is removed.) The creation date of the recovery file on a volume indicates when the recovery image was generated. Click **Recover** to start the operation.

CA *e*Trust Antivirus Software

The CA *e*Trust Antivirus software is preinstalled on all GuardianOS Snap Servers. By default, the software is enabled, but no scan jobs or signature updates have been scheduled. (The server will, however, check for signature updates whenever the server is powered on). These and other antivirus configuration and management tasks are performed using the CA *e*Trust Antivirus GUI, accessed from the **Maintenance > Antivirus** screen of the Administration Tool. This section outlines the major steps in configuring the antivirus software. See the GUI online help for detailed descriptions of all options.

Topics in Antivirus Configuration:

- Antivirus Dependencies
- Launching the CA eTrust Antivirus GUI
- The Local Scanner View
- Scan Job Configuration and Scheduling
- Signature Updates
- Alert Options
- The Move Directory
- Log View

Tip Antivirus functions or options not relevant to the Snap Server have been disabled in the configuration GUI.

Antivirus Dependencies

The Snap Server implementation of CA *e*Trust Antivirus software includes the following features:

HTTP Access and Antivirus Configuration

To access the CA *e*Trust Antivirus configuration interface, HTTP must be enabled on the **Network > Web** screen.

Re-enabling the Antivirus Software

The antivirus software is enabled by default. If the antivirus software is reinstalled (as part of an upgrade process, for example), you will need to enable the software by selecting *Yes* from the Enable CA *e*Trust Antivirus pull-down menu and clicking **Save**. The screen refreshes, and you will be able to launch the antivirus configuration GUI.

Resetting the Server Date and Time

If the current server date and time is reset to an earlier date and time (**System > Date/Time**), the change does not automatically propagate to any scheduled antivirus operations. To synchronize scheduled antivirus operations with the new date and time settings, you must reschedule each operation.

New jobs may be affected by the time change. Be sure to check that new jobs have been executed if a date or time change has been made to the server.

Storage Configuration and the Antivirus Software

The antivirus software resides on the largest volume (that existed at the time the software was installed). If you delete this volume, the CA *e*Trust Antivirus software will also be deleted. The Snap Server automatically reinstalls the antivirus software on the largest remaining volume on the system.

Tip The antivirus re-installation process does not preserve custom antivirus configuration settings. Make a note of any such settings before deleting a volume.

Launching the CA eTrust Antivirus GUI

The CA *e*Trust Antivirus software is enabled by default. Some situations, such as deleting a volume or performing an upgrade procedure, may require you to re-enable the software. To learn how the antivirus software interacts with other GuardianOS software components, see "Antivirus Dependencies" on page 70.

Launching the CA eTrust Antivirus browser interface

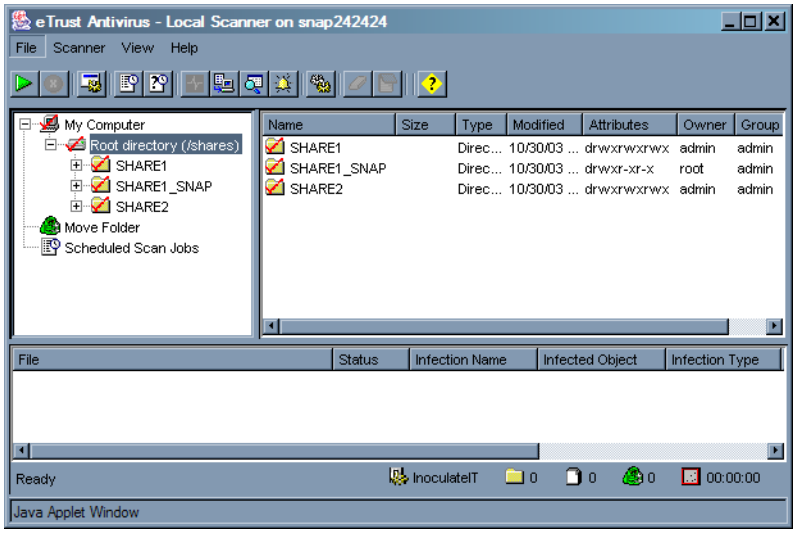
The first time you connect to the GUI, it may take from 30 seconds to several minutes for the application to load, depending on the speed of your connection.

1. Navigate to the **Maintenance > Add-On Features** screen in the Administration Tool.
2. Select *CA Antivirus* from the table.
3. If you need to enable the antivirus software, select *Yes* from the **Enable *e*Trust Inoculate*IT*** pull-down menu and then click **Save**. The screen refreshes.
4. Click the **Configure *e*Trust Inoculate*IT*** link. The splash screen opens first, followed momentarily by the GUI login dialog box.
5. Enter the same administrative user name and password (case sensitive) you have established for the Administration Tool, and then click **Login**. The antivirus GUI box opens.

The Local Scanner View

Use the Local Scanner view to scan a Snap Server for infected drives, folders, files, or disks on demand.

Local Scanner View of the CA eTrust Antivirus GUI



Left-pane Components of the Local Scanner View

Component	Description
Root Directory	Displays the directory structure of the Snap Server. As in Windows Explorer, click folder icons to navigate the structure and display subfolders and files in the right-hand pane.
Move Folder	May contain infected files. The administrator can instruct the software to automatically move infected files to this directory. For more information, see “Scan Job Configuration and Scheduling” on page 73.
Scheduled Scan Jobs	Scan Jobs you schedule appear in this folder. For more information, see “Scheduling a Scan Job” on page 74.

Scan Job Configuration and Scheduling

You can run scan jobs on demand or you can configure scan jobs to run periodically. This section outlines the process of configuring and running manual and scheduled scans. For detailed descriptions of all scanning options, see the CA *e*Trust Antivirus online Help.

Tip You may not want to include Snapshot shares (see "Snapshot Management and Usage" on page 55) as part of your virus scan. Because access to an archived version of the file system provided by a snapshot share is read-only, you cannot treat or move any infected file; you would have to delete the entire snapshot to effect a cure. A more useful approach is to always scan your file system for viruses before running a snapshot. Adjust your antivirus scan schedule to synchronize with your snapshot schedule such that any infected files are cured or removed before the snapshot is scheduled to fire.

Defining Scan Jobs

This section provides an overview of the major choices available in configuring scan jobs. Access these options by selecting **Local Scanner Options** from the Scanner Menu.

Choosing an infection treatment (Scan Tab)

You can instruct the software to perform one of the following file actions when an infected file is found:

Treatment Options for Infected Files

File Actions	Description
Report Only	(Default) Reports when an infection is found.
Delete File	Deletes an infected file.
Rename File	Renames an infected file with an AVB extension. Infected files with the same name are given incremental extensions (e.g., FILE.0.AVB, FILE.1.AVB, and so on). After a file is renamed with an AVB-type of extension, it is not scanned subsequently.
Move File	Moves an infected file from its current directory to the Move directory for quarantine.
Cure File	Attempts to cure an infected file automatically. Choosing this setting enables the **File Options** button. Click this button to display the Cure Action Options and specify how the Cure File option performs. **Tip** The *System Cure* option is not available on Snap Servers.

Setting the type of files to scan (Selections tab)

Use the Selections tab options to choose the types of objects to scan, the types of file extensions to include or exclude from a scan, and the types of compressed files to scan.

- **File Extensions —** You can choose to scan files regardless of extension, or select specific types of extensions to include or exclude.
- **Compressed Files —** To scan compressed files, select the *Scan Compressed Files* check box, and then click **Choose Type** to specify the compressed file extension types.

Filtering File Information for Logs (Manual Scans Only)

You can specify the types of events that are written to a log. Check the *Infected files* option to put information in the log about files that are found to be infected. Check the *Clean files* option to put information in the log about files that are scanned and are not infected. Check the *Skipped files* option to put information in the log about files that have been excluded from the scan.

Running a Manual Scan Job

Before running a local scan job, confirm that the scanner options are correctly configured as described in the previous section.

1 **In Local Scanner View, select folders you want to scan.**

The left-hand pane displays the directory structure of the Snap Server. A red check mark on a folder or file indicates that it is selected for scanning. (By default, all directories and files are selected for scanning.) Click folders or files to toggle file/folder selection on or off.

2 **Run the scan.**

Select **Scanner > Start Scanning**. The interface is unavailable for further configuration while the scan is in progress. The scan results display in the lower pane of the Local Scanner View, and the action taken with each file is listed in the Status column.

Scheduling a Scan Job

A scan job is configured and scheduled in the Schedule New Scan Job dialog box. To open this dialog box, choose the **Scanner > Schedule Scan Job > Create** command.

1 **Set scan options in the Scan and Selection tabs.**

These options are summarized in “Defining Scan Jobs” on page 73.

2 **Schedule the scan.**

The Schedule tab allows you to set a start date and a repeat interval for the scan.

3 **Select the directories to scan.**

The Directories tab lists all paths that currently exist on the server. You can remove or add new paths as desired. You can also use the Exclude Directories tab to achieve the same result.

4 **Click OK.**

You can view scheduled scan jobs by clicking the **Scheduled Scan Jobs** folder in the Local Scanner View. To edit a job, right-click it and choose **Options**.

Signature Updates

Signature updates contain the latest versions of the signature files that recognize the latest infections. They also contain the latest engine versions, which do the work of looking for infections. Signature updates are made available on a regular basis by Computer Associates.

These updates are cumulative, so they contain everything from all previous file updates, plus the newest information on the latest infections. If you have missed a recent update, you only need to collect the latest signature file to have the most up-to-date protection.

Snap Servers are preconfigured to download signature updates from the CA FTP site at ftp://ftpav.ca.com/pub/inoculan/scaneng. Be default, no signature updates are scheduled. The antivirus software will, however, check for signature updates whenever the server is powered on. To update Snap Servers that do not have Internet access, the following methods are available:

Methods of Downloading and Distributing Signature Updates

Method	Description
FTP	Use FTP to download the update files from the Computer Associates FTP site. You can also use FTP to distribute signature updates from one Snap Server (or any FTP server) to another. **Tip** When using FTP, the user name and password are passed as clear text.

Methods of Downloading and Distributing Signature Updates

Method	Description
UNC	Use UNC to distribute signature updates from one Snap Server to another (or from any arbitrary SMB or Windows server). Note that for UNC to work, you must have the Enable Guest Account option set to *Yes* (**Security > Windows**) on the Snap Server on which the signature updates reside. **Tip** Alternatively, you can distribute updates to Snap Servers from any Windows/SMB server. If using this method, make sure the guest account on the chosen server exists, is enabled, and has a blank password.
Local Path	As part of the procedure to provide signature updates to a Snap Server with no Internet access, you can connect to a local path relative to the root, e.g., /shares/SHARE1/virusdefs. Note that the path to the share is case sensitive.

Updating Snap Servers That Have Internet Access

Snap Servers are preconfigured to download signature updates from the CA FTP site at ftp://ftpav.ca.com/pub/inoculan/scaneng. If your Snap Servers have direct access to the Internet, you only need to schedule the downloads to set up automatic signature updates. If access to the Internet is routed through a proxy server, you may also need to specify the name of the proxy server. Both procedures are given next:

To Schedule Signature Update Downloads

1. Choose **Scanner > Signature Update Options**.
2. On the Schedule tab, click **Enable Scheduled Download**, and then select (a) the initial download date and time; and (b) how often to repeat the download.
3. Click **OK**.

To Specify a Proxy Server

1. Choose **Scanner > Signature Update Options**, and click the Incoming tab.
2. Select *FTP* in the list box, and click **Edit**.
3. In the Proxy Name field, enter the IP address of the proxy server, and click **OK**.

Updating a Snap Server That Does Not Have Internet Access

If you have Snap Servers that do not have Internet access, use the following procedures to download the signature files to a machine with Internet access and then copy them to the Snap Server.

Tip When retrieving signature updates, the antivirus software attempts to connect to all the sites in the site list in the order they are listed. To avoid delays or superfluous error messages, delete the default FTP option from the list on Snap Servers that have no Internet access.

1. Using a workstation with Internet access, go to ftp://ftpav.ca.com/pub/inoculan/scaneng and download the following files.
   - All *.tar files containing the word *Linux*, e.g., fi_Linux_i386.tar and ii_Linux_i386.tar
   - All *.txt files containing the string *Sig*, e.g., Siglist.txt and Siglist2.txt
2. Using a method appropriate to your environment, copy the update files to a Snap Server (or any FTP or Windows/SMB server).

   Tip If using a Snap Server, copy the files to the root of a share. You can configure other Snap Servers to automatically get their signature updates from a single Snap Server (see following procedure). To do so, the update files must reside on the root of a share, not a subdirectory within a share.
3. Choose **Scanner > Signature Update Options**, and click the Incoming tab.
4. Click the **Add** button, and select *Local Path* from the Method pull-down menu.
5. In the Path field, enter the path to the directory on the server on which the update file resides. If you are using a Snap Server, the path would be similar to the following:

   /shares/*SHARE1/sigfiles*.

   where *SHARE1/sigfiles* is the share path to the directory containing the signature update files.
6. Click **OK**. The path appears in the list box.
7. Click **Download Now**.

Distributing Updates from One Server to Another

When retrieving signature updates, the antivirus software attempts to connect to all the sites in the site list in the order they are listed. To avoid delays or superfluous error messages, delete the default FTP option from the list on Snap Servers that have no Internet access.

To Distribute Files via UNC

If you have more than one Snap Server with no Internet access, you can perform the previous procedure on just one of them (or any Windows/SMB server), and then configure your other Snap Servers to get the update from that server automatically via UNC.

1. Choose **Scanner > Signature Update Options**, and click the Incoming tab.
2. Click the **Add** button, and select *UNC* in the Method list box.
3. Enter the path to the Snap Server (or Windows/SMB server) to which the update files have been downloaded (see previous procedure) using the following format:

   \\server_name\share_name

   where *server_name* is the name of the server, and *share_name* is the name of the share providing access to the files. (On a Snap Server, the update files must reside on the root of the share.)
4. Click **OK**. The path you entered appears in Download Sources list box.
5. Click **Download Now**.

To Distribute Files via FTP

If you have more than one Snap Server with no Internet access, you can perform the FTP download procedure on just one of them (or any FTP server), and then configure your other Snap Servers to get the signature updates from that server automatically via FTP.

1. Choose **Scanner > Signature Update Options**, and click the **Incoming** tab.
2. Click the **Add** button, and select *FTP* in the Method list box.
3. Enter the following information regarding the server on which the update file resides as follows:
   - In the Host Name field, enter the IP address.
   - In the User Name and Password fields, enter the admin user name and password.
   - In the Remote Path field, enter the path to the directory in which the file resides. If you are using a Snap Server, the path would be similar to the following:

   /shares/*SHARE1/sigfiles*

   where *SHARE1/sigfiles* is the share path to the directory containing the signature update files.

4 Click **OK**. The path you entered appears in Download Sources list box.

5 Click **Download Now**.

Verifying Download Events

Use the following procedure to verify download and distribution events.

1 Select **View > Log Viewer**.

2 In the left-hand pane, select **Distribution Events**. Distribution events are listed in the upper right-hand pane in chronological order.

3 Select a distribution event. The details of the distribution event display in the lower pane.

Alert Options

Alert options allow you to tailor the notification information that is provided to the Alert Manager, cut down on message traffic, and minimize the dissemination of notifications that are not critical. To set alert options, select **Alert Options** from the Scanner menu. The Alert Options dialog box contains the following tabs:

The Tabs of the Alert Options Dialog Box

Tab	Description
The Report Tab	Use the Alert Report options to specify where to send notification information, and the Report Criteria options to manage how frequently messages from the General Event Log are reported. **Tip** The Local Alert Manager option is not supported on Snap Servers.
Alert Filter Tab	Use the Alert Filter options to manage notification severity levels, and to determine what types of messages should be passed to the Alert Manager. **Tip** In the Custom Notification Module, the *Realtime Server* and *Admin server* settings have no effect on Snap Servers.

The Move Directory

You can configure scans to move infected files to the move folder (**Scanner > Local Scanner** Options). To view infected files, click the **Move** directory on the left-hand pane of the Local Scanner View. To manage a moved file, right-click the file and select from the following options:

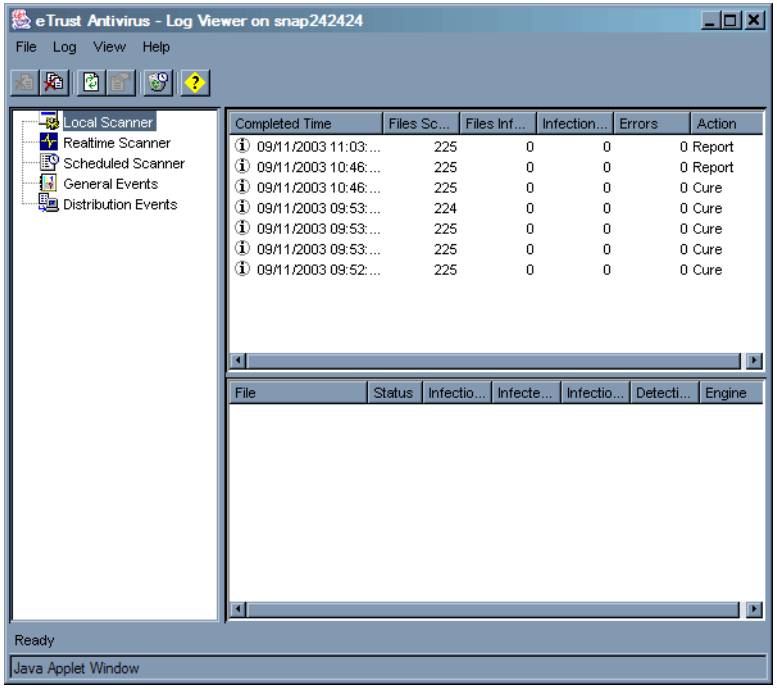
The Right-Click Menu Options for Infected Files

Option	Description
Restore	This option removes the file from the Move Folder and restores it to its original location with its original name and type.
Restore as	This option displays a dialog box that allows you to change the directory location and file name. You can rename a file and isolate it safely in a different location. You may want to use this option, for example, if you do not have another source for the data and you need to look at the file. Or you may have a file that you want to analyze. **Tip** To restore a file to different directory, you must prepend the path to the directory with the string /shares. For example, to restore a file to the SHARE1/sales directory, enter the path as follows: /shares/SHARE1/sales
Restore and Cure	This option allows you to restore the selected item back to the original folder it was in, and cure it. This option is useful if you update the signature files after items have been put in the Move folder. If a cure is provided that you did not have available, you can get the latest signature update and use this option to restore and cure an infected item.
Delete	This option deletes the infected file; no warning or confirmation message is displayed.

Log View

The Log View provides easy access to detailed information on scan, distribution, and other events. To access this view select **Log View** from the View menu.

Log View with Local Scanner selected



Option	Description
Local Scanner	Displays summary information about scan jobs that have run
RealTime Scanner	Not Supported
Scheduled Scanner	Displays summary information on scheduled scans that have run
General Events	Displays the Event log for a given day. Click a date to view all events that occurred that day.
Distribution Events	Displays distribution events by date. Click a date to view detailed information on the distribution event in the lower pane.

Troubleshooting Snap Servers

This chapter describes basic techniques for identifying and resolving common hardware and networking issues.

Topics in Troubleshooting Snap Servers

- The Meaning of LED Indicators
- System Reset Options
- Networking Issues
- Miscellaneous Issues
- Phone Home Support

Additional Resources

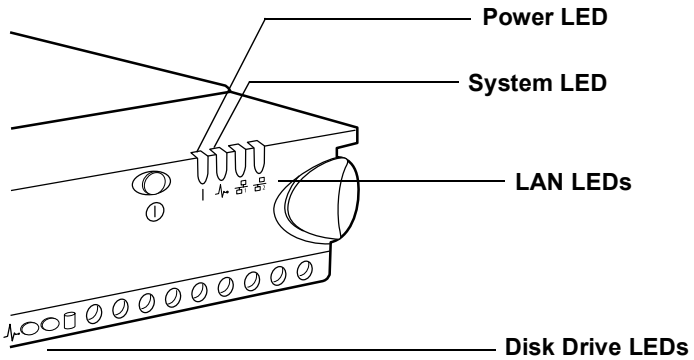
Resource	Description
Knowledge Base	Search for solutions to specific issues by clicking the **Knowledge Base** link on the Snap Appliance support page: http://www.snapappliance.com/support
Hardware Components	Purchase additional hardware components from authorized Snap Appliance resellers.To locate a reseller in your area, click the **Where to Buy** link on the Snap Appliance home page: http://www.snapappliance.com
Field Service Documents	Find a list of the hardware components available for your Snap Server or Snap Disk expansion array and instructions for installing or replacing components by clicking Documentation Center and then navigating to the Field Service Index from the Snap Appliance support page: http://www.snapappliance.com/support

The Meaning of LED Indicators

LED indicators provide information on the status of basic connectivity, disk drives, fan modules, and power supply modules.

Snap Server 4200/4500/15000 Status & Drive Light Behavior

The server has two status lights, two network lights, and two lights for each of the four disk drives, as shown in the following illustration:



Snap Appliance recommends that you become familiar with the operation of these lights.

Power, System, and LAN LEDs

These status lights are located to the right of the power button. Looking at the server from the front, the lights appear in the following order, from left to right: power LED, system LED, LAN 1 (Ethernet1) LED, and LAN 2 (Ethernet2) LED. The LEDs operate as described in the following tables:

Power LED	
Blinking green	The server is initializing (booting up).
Solid green	The server is powered on.
Off	The server is powered off.

System LED	
Blinking green (once per second)	The server is booted up and operating normally.

System LED	
Solid amber	The server has encountered a system error.
Blinking green then amber	The server has booted to maintenance mode. For more information, see “Using Maintenance Modes to Perform System Resets” on page 93.

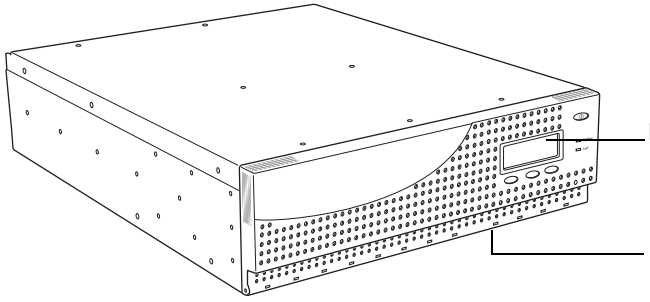
LAN 1 and LAN 2 LEDs	
Solid green	The server is active and connected to the network on the network port.
Off	The port is disconnected or the Ethernet cable is not connected or linked to an active switch.

Snap Server 14000 Status & Drive Light Behavior

This section describes the LED indicators on the Snap Server 14000’s disk drives, power modules, and fan modules.

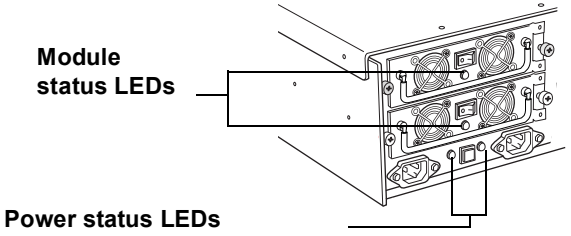
Disk Drive Indicators

If a disk drive fails on a Snap Server 14000, a failure message appears on the front LCD status display. In addition, the disk drive status light below the failed drive turns amber.



Power Supply Module Indicator LEDs

If a power supply fails on a Snap Server 14000, a failure message appears on the front LCD display. On the back of the server, there is a status light on each of the power modules, and below the power supply enclosure two activity lights.

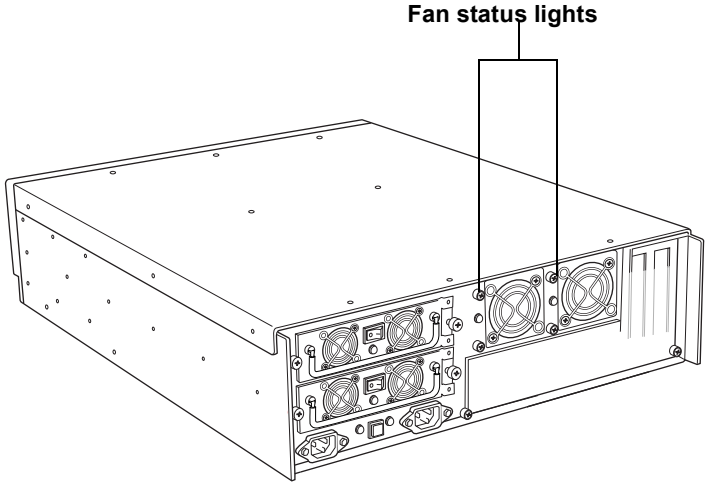


The LEDs operate as described in the following table:

Power LEDs	Module LEDs	Condition of Module
Steady green	Green on both modules	Turned on, no problems
Amber	Amber on failed module	Failed while installed and turned on
Blinking green	Not lit on absent module	Turned off or removed from its bay

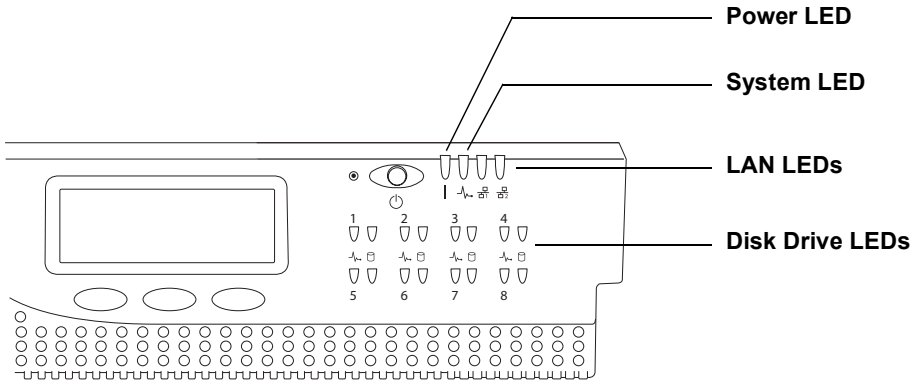
Fan Supply LEDs

If a fan module fails on a Snap Server 14000, a failure message appears on the front LCD display. On the back of the server, the status light to the left of the failed fan turns amber.



Snap Server18000 Status & Drive Light Behavior

The server has two status lights, two network lights, and two lights for each of the eight disk drives, as shown in the following illustration:



Power, System, and LAN LEDs

Looking at the server from the front, the lights appear in the following order, from left to right: power LED, system LED, LAN 1 (Ethernet1) LED, and LAN 2 (Ethernet2) LED. The LEDs operate as described in the following tables:

Power LED	
Solid green	The server is powered on.
Off	The server is powered off.

System LED	
Double-blink green	The server is booting up.
Triple-blink green	The server is shutting down.
Solid or blinking amber at boot time	A problem was detected by BIOS. The server will not boot.
Blinking amber during normal operation	A thermal or other system problem was detected

LAN 1 and LAN 2 LEDs	
Solid green	The server is active and connected to the network.
Off	The port is disconnected; or the Ethernet cable is not connected or linked to an active switch.

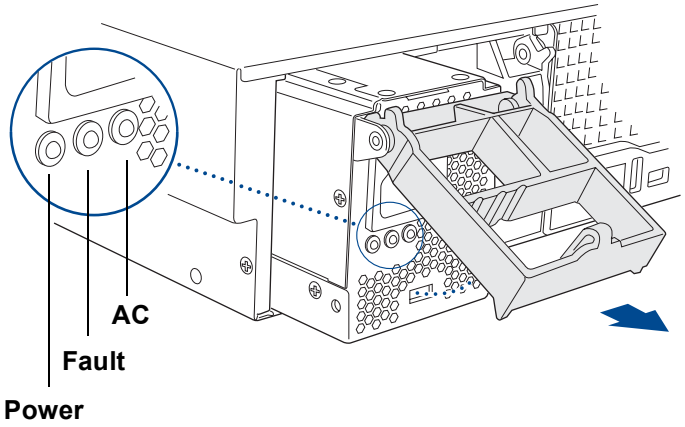
Disk Drive LEDs

Disk drive LEDs on the Snap Server 18000 are located on the bezel to the right of the LED display. The left light indicates drive health. The right light indicates drive activity. They operate as follows:

Health LED (left)	Activity LED (right)	
Solid green	Solid green	Disk drive installed properly but is not active
Solid amber	Solid green/Off	Disk drive installed, but not working correctly
Off	Off	No disk drive installed

Power Supply Module Indicator Lights

The LEDs on a 18000 power module are identified in the following illustration.

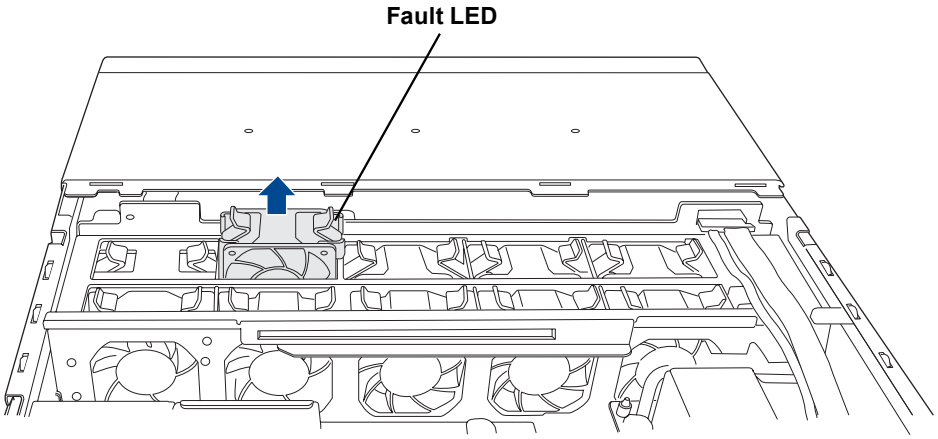


18000 LED Indicators

Power	Fault	AC	Description
Solid green	Off	Solid green	Module is operating properly
Off	Solid red	Solid green	The module has failed
Off	Off	Off	The module is not connected

Fan Module LED Indicator Lights

The Snap Server has no external LEDs that indicate the status of a fan module. The **Monitoring > Status** screen of the Administration Tool indicates when a fan has failed. When the cover of the chassis is removed, the Fault LED on the failed module will be lit. The Fault LED of a Snap Server 18000 fan module is identified in the following illustration. To remove a failed fan module, squeeze its handles together and lift the module out of the unit.

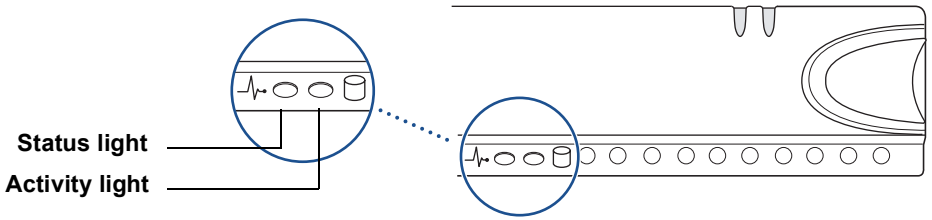


Snap Disk 10 Disk Drive and Power Supply Module LEDs

This section describes the LED indicators on the Snap Disk 10's disk drives and power module.

Disk Drive LEDs

The Snap Disk 10 has two lights below each disk drive. The Status light (left) indicates power. The Activity light (right) indicates drive activity.



The LEDs operate as described in the following table:

Status Light	Activity Light	Condition of Disk Drive
Green	Amber, flashing	Disk drive installed and being accessed
Green	Not lit	Disk drive installed but not being accessed
Amber	Not lit	Disk drive installed but not working properly
Not lit	Not lit	Disk drive removed from its bay

Power Module LEDs

The Snap Disk 10 power module has a single LED. The LED operates as described in the following table:

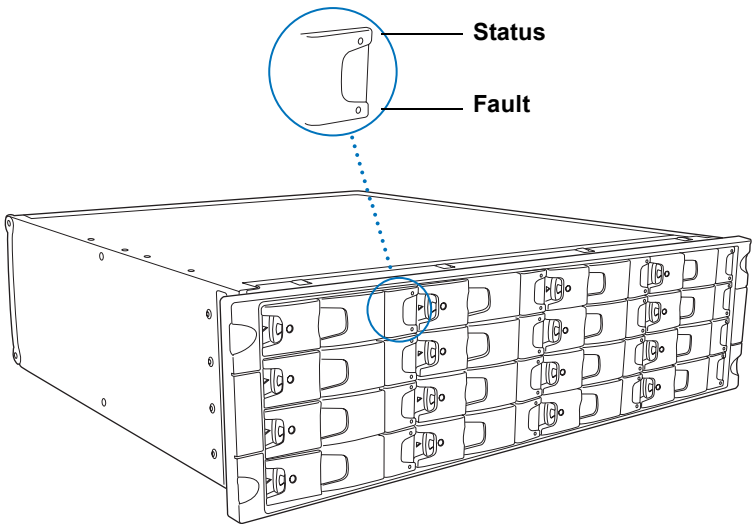
Power Light	Condition of Disk Drive
Solid Green	Power module is installed and working properly
Off	Power module is disconnected, not fully seated, or has failed.

Snap Disk 30SA and Snap Disk 32SA Disk Drive & Power/Fan Module Behavior

This section describes the LED indicators on the Snap Disk 30SA and Snap Disk 32SA's disk drives and power /fan modules.

Snap Disk 30SA and Snap Disk 32SA Disk Drive LEDs

The Snap Disk 30SA and Snap Disk 32SA have two LEDs at the edge of each disk drive as shown in the following illustration.

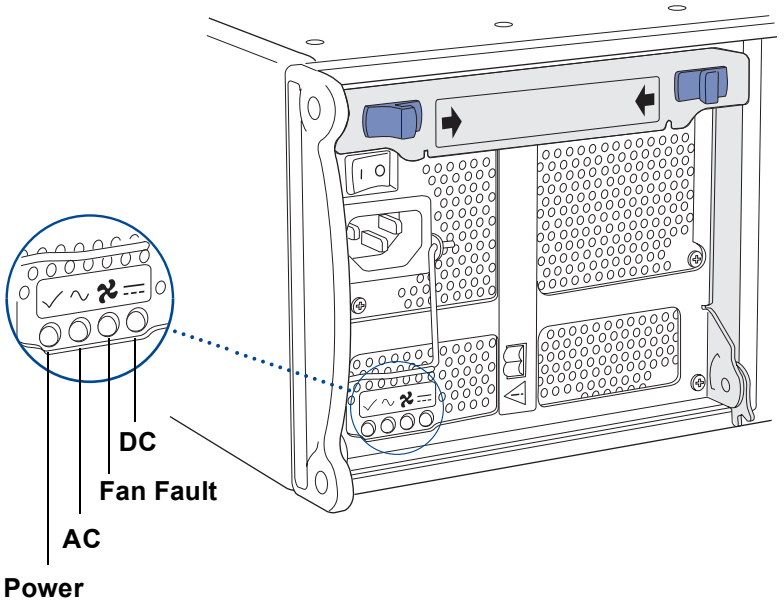


The LEDs operate as follows operate as follows:

Status	Fault	Condition of Disk Drive
Solid green	Off	Disk drive installed properly but is not active
Blinking green	Off	Disk drive installed properly and actively reading/writing information
Solid green	Solid amber	Disk drive installed, but not working correctly
Off	Off	No disk drive installed

Snap Disk 30SA and Snap Disk 32SA Power/Fan Module LEDs

The Power/Fan module has four LED indicators as shown in the following illustration. To remove the module, squeeze the two latches on the handle together and then withdraw the module by pulling the handle towards you.



The LEDs operate as described in the following table:

Power	AC	Fan	DC	Condition of Power/Fan Module
Green	Off	Off	Off	Power and fan working properly
Off	Amber	Off	Amber	AC power supply is disconnected
Green	Off	Red	Off	Fan installed, but not working correctly
Off	Off	Off	Off	Module not seated properly or disconnected from operating host server

System Reset Options

Often the first thing to try in resolving anomalous behavior on a Snap Server is to reset the server to factory defaults.

- Resetting the Snap Server to Factory Defaults
- Using Maintenance Modes to Perform System Resets

Resetting the Snap Server to Factory Defaults

The GuardianOS allows you to reset different components of the system. Default settings can be found in the default configuration sections of Chapters 2, 3, and 4 of the Administrator Guide.

Caution Each reset option requires a reboot of the server. To prevent possible data corruption or loss, make sure all users are disconnected from the Snap Server before proceeding.

Navigate to the **Maintenance > Factory Defaults** screen, and select Select one of the following options, and then click **Save**.

- **Reset Network Configuration To Factory Defaults** returns TCP/IP and other protocol settings to factory defaults.
- **Reset System Settings, Network, and Admin Passwords To Factory Defaults** returns the admin and root passwords to the default value, returns TCP/IP and other protocol settings to factory defaults, eliminates all shares to all volumes, and returns settings for server name, date and time, users, groups, quotas, and the activation and configuration of CA *e*Trust Antivirus to factory default values.

  When the server finishes rebooting, the Login dialog box opens. Enter the default admin password of admin, and click **OK**. The Initial Setup Wizard runs, allowing you to reset the server name, admin password, and IP address.
- **Set Default ACLs For Volume:** <*volume name*> resets the file and directory ACLs on selected volumes to reset the Everyone group to full control. Essentially, all users will be able to access all directories and files after the reset (within the confines of share access settings).

Using Maintenance Modes to Perform System Resets

Should access to the server be lost, the Snap Server's maintenance mode functions can be used to reset server settings and re-establish connectivity. On Snap Servers 4200, 4500, 15000, and 18000, the maintenance mode screens may appear after you try to connect to the server when the GuardianOS has been compromised or the server's boot process has been interrupted, and as a result access to the server using the Administration Tool is not possible. On the Snap Server 14000, all maintenance modes are available from the LCD. The six maintenance modes are as follows:

Mode	Description
1	Clears the IP address stored on the network, resets the server to use DHCP, and resets speed/duplex settings to autonegotiate.
2	Returns the admin and root passwords to the default values

Mode	Description
3	As in mode 1, clears the IP address stored on the network, resets the server to use DHCP, and resets speed/duplex settings to autonegotiate. Mode 3 additionally, resets network bonding to standalone and resets all network protocols to factory defaults.
4	As in mode 1, clears the IP address stored on the network, resets the server to use DHCP, and resets speed/duplex settings to autonegotiate. As in mode 3, resets network bonding to standalone and resets all network protocols to factory defaults. Mode 4 additionally eliminates all shares to all volumes, and returns settings for the server name, date and time, users, groups, quotas, and the activation and configuration of CA eTrust Antivirus to factory default values. **Tip** When the server finishes rebooting, the Login dialog box opens. Enter the default admin password of admin, and click OK. The Initial Setup Wizard runs, allowing you to reset the server name, admin password, and IP address.
5	Reserved for technical support
6	Reserved for technical support

To Run the Snap Server 14000 in Maintenance Mode

1. Power off the server.
2. Depress the middle button (under the LCD panel) and power up the server, keeping the middle button depressed until maintenance mode 1 displays in the Snap Server's LCD.
3. Use the buttons to navigate to the desired maintenance mode.

To Invoke Mode 1 Using the Reset Button on Snap Servers 4200, 4500, 15000, or 18000

On Snap Servers 4200, 4500, and 15000 remove the front bezel and press the white button, located to the left of the black power button. On the Snap Server 18000 the reset button is accessed via a small hole next to the power button on the front of the server. Use a small device like a paperclip to push the reset button. The system will reboot after about a minute. As a part of the reset and reboot process, the Snap Server clears user-defined settings such as DHCP configuration, the server name defaults to its factory setting, network speed and bonding settings are returned to their defaults, and the Administrator password is reset to the default (`admin`). The Snap Server then does a full boot.

Networking Issues

The Server Cannot Be Accessed over the Network

Inaccessibility may be caused by a number of reasons. To resolve this issue, use one of the following methods:

- Verify that you have the correct IP address of the server, and try to connect again.
- Verify that the LED for the primary Ethernet port is lit. (This light indicates network connectivity.) If the light is not lit, do the following in the order indicated:
  a. The most likely cause is the physical connection. Check for a loose or damaged cable, or poor connections in the port connector.
  b. This problem may also be caused by a mismatch between the settings on the switch or hub and the settings on the Snap Server Ethernet port. These settings must match. To resolve the problem, make sure the port settings on the hub or switch match the settings for the primary port as configured on the **Network > TCP/IP** screen of the Administrator Tool. Use the autonegotiate setting on both the switch and the server port.

You Have No Access to the Snap Server via HTTP

When trying to access the Snap Server via HTTP the Web browser times out. The server can be accessed using the ping command or Windows Explorer.

a. HTTP and HTTPS are both enabled by default on Snap Servers. Try typing HTTPS in the Web address rather than HTTP. If you are able to access the server via HTTPS, you can re-enable HTTP on the **Network > Web View** screen.

b. If you cannot access the server via HTTPS, try resetting the server as described on “Using Maintenance Modes to Perform System Resets” on page 93.

An Access Denied Message Appears after Configuring Microsoft Domain Security

Customers who have configured local users and local groups with the same name as their domain users and groups can have security conflicts if they integrate with Microsoft Domain Security. The Snap Server will authenticate the users as local Snap Server users before authenticating through the NT Domain. However, the NT Domain users/groups may be the ones that had been granted access to the shares.

Be careful not to add local users or groups that are duplicates of those that are found on the Windows domain controller.

The Snap Server Does Not Operate Properly on a Network Running Gigabit-Full-Duplex

For Gigabit Ethernet to operate properly, both the switch and the Snap Server's primary Ethernet port (Ethernet1) must be set to *Auto* (autonegotiate). Any other setting will result in unexpected behavior and reduced performance.

The Network Does Not Have a DHCP Server and the Snap Server IP Address Is Unknown

Install Snap Server Manager from the Snap Server User CD onto a client workstation on the same subnet as the Snap Server. You can then use the utility to discover all Snap Servers on that network segment, and to assign a static IP addresses as necessary.

Apple Users Cannot Log into the Snap Server as Windows Users

To allow Apple users to access a Snap Server, replicate their user names and passwords locally on the Snap Server.

An Apple Mac Connection to the Snap Server Is Reset When a Share Is Updated

A Mac client connected to a Snap Server share may receive a message stating that the Snap Server will be going down in 5 minutes. This is because the AFP protocol needs to be restarted. To resolve this issue, reconnect to the share.

Problems Occur with Domain Controller Authentication

You are receiving the following errors in your error log:

```
SMB: Domain Controller unavailable SMB: Username not connected to
Domain Controller
```

This means that either your PDC is down, or the Snap Server is unable to reach it. Because it cannot communicate with the domain controller, it is not able to authenticate the user. Check to make sure the PDC is online, is consistently reachable via the network, and that users can authenticate to the PDC.

You Start Your Snap Server but Cannot See It on the Network

10.10.10.10 is the default address for the primary Ethernet port if no DHCP server is seen on your network. Ensure that the Ethernet cable is connected securely to both the network port and the server's primary Ethernet port. For the 14000, the primary port is located on the motherboard; for other GuardianOS Snap Servers, it is the port labeled port '1'. Also, check to see that the Link light on the front of the Snap Server is lit (solid green). If the Link light is off, this is normally caused by a

mismatch between the switch/hub and the Ethernet port on the Snap Server. To resolve this problem, verify that both settings (if using both of the server's Ethernet ports) on the switch/hub match the setting on the server. When the server is shipped from the factory, both ports are set to autonegotiate. Therefore, the switch/hub *must* be set to autonegotiate to initially connect to the server.

The NT Event Viewer Reports Forced Master Browser Election When Snap Servers Are Online

Snap Servers have the ability to act as a master browser on a Microsoft network. This may cause a message to appear in an NT server's event log about a forced master browser election.

Snap Servers should lose elections to Windows domain controllers (NT/2K/2K3), but win against standalone Windows servers (NT/2K/2K3) and workstations (all versions); however, users often prefer to prevent this election entirely.

The master browser option is enabled by default on Snap Servers to allow them to appear more rapidly in a peer-to-peer Windows environment. In some environments that include NT server systems, this may cause the NT server to show warnings about having to force a master browser election in the event log. You can prevent these warning messages by disabling the Master Browser option on the **Networking > Windows** screen.

You Try to Mount to a Share on Your Snap Server from Your Linux Workstation and You Receive an RPC Timeout Message

Check the firewall configuration to your Linux workstation. Be sure you have not blocked the ability to receive TCP or UDP communications. If problems persist, contact Snap Appliance Technical Support.

You Receive an Access Denied Message When Attempting to Mount a Share on Your Snap Server from A Linux Workstation.

If you are logged in as *root* on your workstation and NFS is enabled on your Snap Server, this message can be misleading, causing you to look for security issues, when in fact it could be a command syntax issue. For example, the common Linux mount command:

```
mount 192.168.32.124:SHARE1 /mnt
```

is missing a forward slash (/) in the command, which will return an Access Denied message. The correct syntax should be the following:

```
mount 192.168.32.124:/SHARE1 /mnt
```

Tip The share name is case sensitive.

You Cannot Log in as root to the Snap Server

The root account password is tied to the admin accout password. If you cannot log in as root, change the password for the admin account on the **System > General Settings** screen. Use the admin password to log in as root.

Snap Disk 10 Disk Drives do not Appear on the Storage > Devices screen.

Verify that the Snap Disk 10 is connected properly to the Serial ATA connector at the rear of the Snap Server 4500 and that the expansion array is properly connected to the power supply. Then, to initialize the Snap Disk 10, power off and then power on the Snap Server 4500.

Caution Make sure to use a screwdriver to firmly seat the connectors on the Snap Disk 10 and the Snap Server 4500. Tightening the connectors by hand will not work.

Safari 1.0.2 on MacOS 10.2.x Unexpectedly Crashes

This Safari issue has been resolved in MacOS 10.3.x, upgrading your MacOS to 10.3.x or later will install an updated version of Safari and resolve this issue.

The S2S Managemenent Console does not Start Successfully

You must allow popups on your client when connected to the Snap Server to view some error messages and to allow the management console to run.

You must also have the latest Java Virtual Machine (JVM) installed on your client to support S2S.

Tip The JVM which installs as a part of the Snap Server Manager installation process will properly support S2S. If you have not already installed SSM on your client, it can be installed from your User CD or the Snap Appliance download site.

In some netowrk configurations, name resolution may be failing to allow the VM in teh browser to successfully allow the management console to load. Reauthenticate to the Snap Server via IP address rather than server name.

The Snap Server Manager or S2S Installer does not work using Internet Explorer on Windows 2003 Server

The default security settings do not allow active-X components to run. You must download the package to successfully complete the installation on Windows 2003.

You Are Unable to See Your Domain Users When Trying to Set Up Windows Security Permissions on File Folders

The Snap Server (GuardianOS) has joined the Active Directory domain properly, and you can see the domain users when you set Share permissions from the browser-based Administration Tool.

Make sure the Windows client (PC) you are trying to set permissions from is assigned a valid DNS server. You can check your Windows client using the **`ipconfig`** command from a command prompt.

Miscellaneous Issues

You Backed Up Your Snapshot Share and Are Now Attempting to Restore It, and the Operation Fails

A snapshot share is read-only. You can restore the data to a read-write accessible share.

The NetVault Client Cannot Connect to the NetVault Server on the Snap Server

Occasionally, after enabling NetVault for GuardianOS for the first time, the NetVault for GuardianOS Server may not start properly. If this happens, the NetVault client application may not be able to connect to the NetVault for GuardianOS server running on the Snap Server. To resolve this issue, simply disable and then re-enable the NetVault for GuardianOS Server via the **Maintenance > Add-On Features** screen.

Power to the Snap Server Is Unexpectedly Cut Off due to a Power Outage

Snap Appliance recommends that you use an uninterruptible power supply (UPS) with the Snap Server. If you did not have a UPS attached to the server at the time of the power outage, use the following procedure:

1. Turn off the power supplies on the 14000, and leave them off until the power situation stabilizes. On Snap Servers 4200, 4500, 15000 and 18000, which have no on/off switch, remove the power cables. On SD30s and higher turn off the power switches on the back of the unit.
2. Once the power is restored and stabilized, turn the power supplies back on and reboot the server.

   Once the Snap Server boots, it begins resynchronizing the RAID(s) if necessary. You can use the server during the resynchronization, but performance will be a little slower than normal. Do not remove drives, however, while the server is resynchronizing the RAID.

The Server Is Not Responding to File Requests or Configuration Commands

Call your Snap Appliance technical support representative.

Problems with Cable Arm on the 18000 with a SCSI Cable Attached

The size of the connector on an attached SCSI cable may prevent the 18000 from fully withdrawing into a rack when the cable management arm is attached. To resolve this problem, remove the cable management arm.

The Admin Password to the Administration Tool Is Not Available

Use one of the following methods as appropriate.

- **Snap Server 4200, 4500, 15000, and 18000 —** You can reset all system settings, including the admin password, to factory defaults (as described in "Using Maintenance Modes to Perform System Resets" on page 93); then use the Administration Tool to set a new password.
- **Snap Server 14000 —** Use the LCD to navigate to Maintenance Mode 2 to clear the administrative password; then use the Administration Tool to set a new password.

The Snap Server 14000 or 18000 LCD is flashing

A flashing LCD indicates a server panic. In some cases, rebooting the server may solve the problem. However, if this condition occurs more than once, try resetting the system as described in "Using Maintenance Modes to Perform System Resets" on page 93.

Phone Home Support

Phone Home Support e-mails system logs and files that contain information useful for troubleshooting purposes to Snap Appliance technical support. You can use the **Monitoring > Support** screen to open a new case with technical support; or, in the course of working to resolve an issue, a tech support representative may ask you to send this file. If a case is already in progress, you will need to enter the case number provided by the technical support representative.

Tips Phone home support interacts with two fields on the **System > E-mail Notification** screen: (1) To use phone home support, you must enter a valid SMTP server IP address on the E-mail Notification screen; and (2) the first e-mail address listed in the Recipient(s) field populates the Admin E-mail Address field on the Support screen.

Complete the following fields as appropriate and click **Send**.

Text Field	Description
Subject:	(Required) Enter a concise description that identifies the issue.
Case:	(Required) Select *New Case* if you are e-mailing technical support for the first time. Select *Existing Case* if you have previously contacted technical support concerning the issue.
Case Number:	If you selected *Existing Case* above, enter the case number provided by technical support.
Reply-to Address:	(Required) This field defaults to the first e-mail address entered as a recipient on the **System > E-mail Notification** screen. If necessary, enter at least one e-mail address that will serve as the contact e-mail address for this issue. To receive a copy of the e-mail and system information attachment, select the *Cc Admin* check box.
Comments:	(Required) Enter additional information that will assist in the resolution of the problem.

Third-Party Backup Applications

This appendix describes how to install the following backup agents on the Snap Server from a Linux or a Windows backup host system:

- CA BrightStor ARCServe 2000 v7.0
- CA BrightStor ARCServe Backup v9.0
- CA BrightStor Enterprise Backup v10.0
- Legato NetWorker v6.1.1
- VERITAS NetBackup v3.4.1
- VERITAS Backup Exec v8.6, v9.0, v9.1
- VERITAS NetBackup 4.5 Feature Pack 6 for Windows

Tip These backup packages do not support the backup of extended POSIX ACLs. If you use one of these packages, Snap Appliance strongly recommends you create a Snap Server disaster recovery image (see page 62) before you perform a backup.

Agent Installation Procedures:

- Preparing to Install a Third-Party Backup Agent
- Pre-installation Tasks
- Installing Third-Party Agent Software

Preparing to Install a Third-Party Backup Agent

Before performing one of the backup agent installation procedures described in this appendix, make sure you have the following information and tools:

- **Backup and media server IP addresses —** Most backup agents need to know the IP addresses of the backup and media servers you plan to use with the Snap Server. You will use the **Maintenance > Host File Editor** screen in the Snap Server's Administration Tool to supply a host-name-to-ip-address mapping that persists across system reboots.
- **Backup software sees the Snap Server as a UNIX/Linux client —** When you configure a backup server to see the agent or client running on the Snap Server, assume the server is a UNIX or Linux client.
- **The agent/client files required by your backup software —** Typically, these files are either provided on your backup software's User CD or are available for download from the manufacturer's website. You will need to copy these files (usually delivered in a compressed format, e.g., as **.rpm*, **.tgz*, or **tar* files) to the Snap Server.
- **A secure shell (SSH) client —** To remotely install any backup agent on the Snap Server, you must have a secure shell (SSH) client installed on a remote workstation. The Snap Appliance SSH implementation is compatible with both SSH1 and SSH2. If you do not already have an SSH client application installed, you can download one from the Internet.

  Tip The commands you must enter via SSH to install your backup agent are case sensitive; pay careful attention to the capitalization of commands, and enter them exactly as shown.

- **Locate the Snap Server backup and restore path —** Backup servers often request the path for backup and restore operations on the Snap Server. When you configure a backup server to see the agent or client running on the Snap Server, use the following path:

  /shares/*sharename*

  where *sharename* is the name of the share to be backed up. If you have accepted the default Snap Server configuration, the correct path is as follows:

  /shares/SHARE1

Pre-installation Tasks

Perform the following tasks prior to installing any agents.

1 **Identify backup and media servers to the Snap Server.**

In the Administration Tool, navigate to the **Maintenance > Host File Editor** screen and click **Add**. In the screen that opens, do the following: (a) enter the IP address of the backup or media server; or (b) enter one or both of the following as required by your backup software:

- Host name (long form): Enter the fully qualified address for the backup server using the *myserver.mydomain.com* format.
- Host name (short form): Enter an abbreviated address for the backup server using the *myserver* format.

Click **Save**. The entry appears on the Host Editor screen. Repeat this procedure for each backup and media server you plan to use.

2 **Enable SSH on the Snap Server.**

Navigate to the **System > SSH** screen, and in the Enable SSH pull-down menu, select *Yes*, and then click **Save**. Secure Shell is immediately available.

Caution Leaving SSH enabled is a security risk. Snap Appliance strongly recommends that you disable SSH as soon as you complete the installation procedure.

3 **Create a directory on the Snap Server called *agent*.**

You must create a directory on the Snap Servers to which you will copy the agent files. For purposes of illustration, the procedures described in this appendix assume that this directory is called *agent*. Navigate to the **Storage > Directories** screen, click **Create Directory**, enter agent, and then click **Continue**.

Tip VERITAS NetBackup users should skip the next step and proceed to "Installing a VERITAS NetBackup 3.4.1 Client" on page 109.

4 **Copy the agent/backup files to the Snap Server.**

Using a method appropriate to your environment, copy the agent/client files to the directory you just created for this purpose.

Installing Third-Party Agent Software

For purposes of illustration, the procedures in this section assume that (1) you are using the default Snap Server configuration; and (2) you have created a directory called *agent* (to which to copy your agent/client files) on the default share (SHARE1), such that the path to the directory is */shares/SHARE1/agent*.

- Installing a CA BrightStor ARCserve or CA Enterprise Agent
- Installing a VERITAS Backup Exec Agent
- Installing a VERITAS NetBackup 3.4.1 Client
- Installing the VERITAS NetBackup 4.5 FP6 Client
- Installing a Legato NetWorker Client

Installing a CA BrightStor ARCserve or CA Enterprise Agent

This section explains how to install the CA BrightStor ARCServe 2000 v7, CA BrightStor ARCServe Backup v9, and CA BrightStor Enterprise Backup v10.

Tip Installing the BrightStor ARCserve backup agent on a Snap Server requires three agent (**.rpm*) files. These agent files are available from your BrightStor ARCserve CD, but some ARCserve CDs may not contain all the required files. To obtain the files you need, contact Computer Associates.

1. Connect to the Snap Server via SSH.
2. At the prompt, login as admin, using the password you created for this account during the initial setup of the server.
3. To change to superuser, enter the following command and press Enter:

   ```
   su -
   ```

4. At the prompt, enter the admin user password, and press Enter:
5. To change to the agent directory, type the following command and press Enter:

   ```
   cd /shares/SHARE1/agent
   ```

6. To unpack the agent files for CA BrightStor ARCServe 2000 v7.0, enter the following commands at the prompt, and press Enter after each one.

   Tip When you unpack the agent files, ignore the errors regarding the bin group and bin user. These errors will not affect installation or use of the agent.

   ```
   rpm -Uvh --nodeps calicens.rpm
   rpm -Uvh --nodeps uagent.rpm
   rpm -Uvh --nodeps asagent.rpm
   ```

7 To change to the agent directory, enter one of the following commands and press Enter:

```
cd /opt/uagent (for ARCserve 2000 v7 only)
cd /opt/CA/uagent (for ARCserve v9 and Enterprise v10)
```

8 To start the agent, enter the following command and press Enter:

```
./uagentsetup
```

The BrightStorARCserve agent is now installed.

9 Close the SSH client, and then return to the Administration Tool and do the following:

a To disable SSH on the Snap Server, navigate to the **System > SSH** screen, select *No*, and then click **OK**. SSH is immediately disabled.

b To start the newly installed backup agent, navigate to the **Maintenance > Shutdown/Reboot** screen, and click **Reboot**.

10 Delete the agent files you copied to the Snap Server because they are no longer needed.

11 To verify the success of the installation, use your backup management software to configure and run a test backup.

Installing a VERITAS Backup Exec Agent

To install the VERITAS Backup Exec UNIX/Linux agent, use the following procedure:

1 Connect to the Snap Server via SSH, and log in as admin using your admin user password.

2 To change to superuser, enter the following command and press Enter:

```
su -
```

3 At the prompt, enter the admin user password, and press Enter.

4 To change to the agent directory, enter the following command and press Enter:

```
cd /shares/SHARE1/agent
```

5 To unpack the agent files, enter the following command and press Enter:

```
tar vxf filename.tar
```

where *filename* is the name of the agent file. Then press Enter to list the files and directories that you are installing.

6 To run the Backup Exec agent installation, type the following command:

```
./INSTALL
```

Then press Enter and follow the prompts, using the default install locations and default options.

Caution You must respond to "yes" or "no" prompts in lowercase (y or n); using uppercase will cause an error and abort the procedure.

7 When prompted for the platform, enter n and press Enter to reject the default selection; then specify the Linux 2.4 Kernel (usually option 7), and press Enter.

8 If the script requests the path for backup and restore on the Snap Server, use the following path (assuming you used the default configuration):

```
/shares/SHARE1
```

9 At the multi-NIC machine prompt, enter y, and press Enter. Then at the specify network interface prompt, do one of the following:

- If your Snap Server is configured in standalone mode (multihoming), enter y, press Enter, and then at the next prompt, enter the IP address of the appropriate port, and press Enter.
- If your Snap Server is not configured in standalone mode, enter n, and press Enter.

10 Answer the remaining prompts.

11 To start the agent, type the following command and press Enter:

```
/etc/rc.d/init.d/agent.init start
```

The VERITAS Backup Exec agent is now installed.

12 Close the SSH client, and then return to the Administration Tool and do the following:

a To disable SSH on the Snap Server, navigate to the **System > SSH** screen, select *No*, and then click **OK**. SSH is immediately disabled.

b To start the newly installed backup agent, navigate to the **Maintenance > Shutdown/Reboot** screen, and click **Reboot**.

13 Delete the agent files you copied to the Snap Server because they are no longer needed.

14 To verify the success of the installation, use your backup management software to configure and run a test backup.

Installing a VERITAS NetBackup 3.4.1 Client

This section describes how to install the UNIX/Linux agent from VERITAS NetBackup.

1. Copy the NetBackup *NBClients* directory and the *Linux* directory from the root of the NetBackup CD to the agent directory on the Snap Server.
2. Connect to the Snap Server via SSH, and login as admin using your admin user password.
3. To change to superuser, enter the following command and press Enter:

   ```
   su -
   ```

4. At the prompt, enter the admin user password, and press Enter.
5. To change to the agent directory, enter the following command and press Enter:

   ```
   cd /shares/SHARE1/agent
   ```

6. To run the client installation, type the following command:

   ```
   ./NBClients/catalog/anb/client.inst
   ```

   Press Enter and follow the prompts on the screen.

7. Choose Linux as the OS, and press Enter.

   Tip At the end of the installation process, a few errors will appear saying that the installer cannot find the CD-ROM. This is caused by the installer attempting to unpackage the Java files. The required Java files are already on the Snap Server and are not a required component of the installation.

   The VERITAS NetBackup client is now installed.

8. Close the SSH client, and then return to the Administration Tool and do the following:

   a. To disable SSH on the Snap Server, navigate to the **System > SSH** screen, select *No*, and then click **OK**. SSH is immediately disabled.

   b. To start the newly installed backup agent, navigate to the **Maintenance > Shutdown/Reboot** screen, and click **Reboot**. In the future, the NetBackup client will start each time you reboot the Snap Server.

9. Delete the *NBClients* and *Linux* directories that you copied from the CD to the Snap Server as they are no longer needed.
10. To verify the success of the installation, use your backup management software to configure and run a test backup.

Installing the VERITAS NetBackup 4.5 FP6 Client

This section describes how to install the Veritas NetBackup 4.5 FP agent on a Snap Server to enable interoperability with NetBackup 4.5 Feature Pack 6 for Windows. Procedures for installing from the following media are given:

- The CD for *Veritas NetBackup 4.5 Feature Pack 6 for AIX, HP*-UX
- The tarball named *NB45FP6_AIX_HP_Linux.tar.Z*

Tip At the time this document was published, the tarball was available at the following URL: http://seer.support.veritas.com/docs/264638.htm.

Installation from a Tarball

This procedure assumes you created a directory on the Snap Server for the purposes of this installation at */shares/SHARE1/NBclientinstall*.

1. Connect to the Snap Server via SSH, and log in as admin using your admin user password.
2. To change to superuser, enter the following command and press Enter:

   ```
   su -
   ```

3. At the prompt, enter the admin user password, and press Enter.
4. To change to the NBclientinstall directory, enter the following command and press Enter:

   ```
   cd /shares/SHARE1/NBclientinstall
   ```

5. To unpack the agent files, enter the following command and press Enter:

   ```
   tar -xvzf NB45FP6_AIX_HP_Linux.tar.Z
   ```

6. A number of files and directories are listed. Delete the unecessary Java installation files by running the following command:

   ```
   rm -vR /shares/SHARE1/NBclientinstall/NB-Java
   ```

7. To start the NetBackup client install run the following command:

   ```
   ./NBClients/catalog/anb/client.inst
   ```

8 You will be prompted for the NetBackup server name and for the NetBackup client name.

- Specify the hostname of the already existing NetBackup Server on your network for the NetBackup server.
- Specify the name of the Snap Server to which you are installing as the NetBackup client.

Errors Messages To Be Ignored

Tip Towards the end of the installation, errors about copying Java UI files that are of no consequence to backup functionality may display. Simply ignore these messages.

You may receive this error after specifying the NetBackup server:

```
./NBClients/catalog/anb/client.inst: ${Trace_File}: ambiguous
redirect
```

You may receive these errors at the end of the installation due to not installing the unnecessary Java files:

```
Error reading the cdrom.
A problem was encountered installing Java pieces.
Aborting.
A failure was detected running /shares/SHARE1/NBclientinstall/
NBClients/anb/Clients/usr/openv/netbackup/client/Linux/
RedHat2.4/cp_to_client DARKSTAR-2K eemp
```

9 To delete the unpackaged tarball files, run the following command:

```
rm -vR /shares/SHARE1/NBclientinstall
```

10 Close the SSH client, and then return to the Administration Tool and do the following:

a To disable SSH on the Snap Server, navigate to the **System > SSH** screen, select *No*, and then click **OK**. SSH is immediately disabled.

b To start the newly installed backup agent, navigate to the **Maintenance > Shutdown/Reboot** screen, and click **Reboot**.

11 To verify the success of the installation, use your backup management software to configure and run a test backup.

Installing from a CD

1. Copy the NetBackup *NBClients* directory and the *Linux* directory from the root of the NetBackup CD to the *agent* directory on the Snap Server.
2. Connect to the Snap Server via SSH, and login as admin using your admin user password.
3. To change to superuser, enter the following command and press Enter:

   ```
   su -
   ```

4. At the prompt, enter the admin user password, and press Enter.
5. To change to the *agent* directory, enter the following command and press Enter:

   ```
   cd /shares/SHARE1/agent
   ```

6. If you copied the files from a windows machine, create you need to create a symbolic link by entering the following commands: (Otherwise, skip to the next step.)

   ```
   cd ./NBClients/anb/Clients/usr/openv/netbackup/client/Linux/
   RedHat2.4
   ```

   ```
   ln -s bpbackup bparchive
   ```

   ```
   cd /shares/SHARE1/agent
   ```

7. To start the NetBackup client install run the following command:

   ```
   ./NBClients/catalog/anb/client.inst
   ```

   You will first be prompted for the NetBackup server name and second for the NetBackup client name.

8 You will be prompted for the NetBackup server name and for the NetBackup client name.

- Specify the hostname of the already existing NetBackup Server on your network for the NetBackup server.
- Specify the name of the Snap Server to which you are installing as the NetBackup client.

Errors Messages To Be Ignored

Tip Towards the end of the installation, errors about copying Java UI files that are of no consequence to backup functionality may display. Simply ignore these messages.

You may receive this error after specifying the NetBackup server:

```
./NBClients/catalog/anb/client.inst: ${Trace_File}: ambiguous
redirect
```

You may receive these errors at the end of the installation due to not installing the unnecessary Java files:

```
Error reading the cdrom.
A problem was encountered installing Java pieces.
Aborting.
A failure was detected running /shares/SHARE1/NBclientinstall/
NBClients/anb/Clients/usr/openv/netbackup/client/Linux/
RedHat2.4/cp_to_client DARKSTAR-2K eemp
```

9 Close the SSH client, and then return to the Administration Tool and do the following:

a To disable SSH on the Snap Server, navigate to the **System > SSH** screen, select *No*, and then click **OK**. SSH is immediately disabled.

b To start the newly installed backup agent, navigate to the **Maintenance > Shutdown/Reboot** screen, and click **Reboot**. In the future, the NetBackup client will start each time you reboot the Snap Server.

10 Delete the *NBClients* and *Linux* directories that you copied from the CD to the Snap Server as they are no longer needed.

11 To verify the success of the installation, use your backup management software to configure and run a test backup.

Installing a Legato NetWorker Client

This section describes how to install the Legato NetWorker UNIX/Linux client as well as special procedures Legato NetWorker users must use in order to perform backup and restore operations on the Snap Server.

To Install the Legato Networker Client

1. Connect to the Snap Server via SSH, and login as admin using your admin user password.
2. To change to superuser, enter the following command and press Enter:

   ```
   su -
   ```
3. At the prompt, enter the admin user password, and press Enter.
4. Use the **cd** command to change to the directory in the share, for example:

   ```
   cd /shares/SHARE1/agent
   ```
5. To unpackage the client files, enter the following commands:

   ```
   tar xvfz nw_linux86.tar.gz
   cd LGTOclnt
   rpm -Uvh --nodeps lgtoclnt-x.x-x.i386.rpm
   ```

   where *x.x-x* is the version number.
6. To start the Legato NetWorker daemon, enter the following command at the console:

   ```
   /etc/rc.d/init.d/networker start
   ```

   The NetWorker client is now installed.
7. Close the SSH client, and then return to the Administration Tool and do the following:
   a. To disable SSH on the Snap Server, navigate to the **System > SSH** screen, select *No*, and then click **OK**. SSH is immediately disabled.
   b. To start the newly installed backup agent, navigate to the **Maintenance > Shutdown/Reboot** screen, and click **Reboot**.
8. Delete the client files you copied to the Snap Server because they are no longer needed.
9. To verify the success of the installation, use your backup management software to configure and run a test backup.

Backup and Restore Operations with a Legato NetWorker Client

This section describes special procedures Legato NetWorker users must use in order to perform backup and restore operations on the Snap Server.

To Add the Snap Server as a Root User

For backup operations, NetWorker requires that the Snap Server be configured as a root user. To add the Snap Server root user as one of the administrators, use the following procedure.

1. Open the NetWorker Administrator application.
2. Click the **Set Up Server** icon.
3. In the Administrator field, enter

   `root@hostname`,

   where *hostname* is the host name of the Snap Server.
4. Click **OK**.

Recover and Retrieve Operations

The Legato NetWorker administrative interface does not support data recovery operations from a remote client for a Linux-based operating system such as the GuardianOS. To recover data, you must execute one of the following CLI commands from an SSH client.

- **Recover —** The `recover` command restores data from a normal backup job.
- **Nsrretrieve —** The `retrieve` command restores data from an archive.

Use either the `recover` or the `retrieve` command exactly as described below. For more details on these commands, see the *Legato Networker Command Reference*.

To Recover Data from a Normal Backup Operation

1. Using an SSH client, connect to the Snap Server and login using the admin user name and password.
2. To change to superuser, enter the following command and press Enter:

   `su -`
3. At the prompt, enter the admin user password, and press Enter.

4 Enter one of the following commands, and press Enter:

- To recover data to its original location:
  recover -s *backupservername* **-c** *snapservername* **-f -i "/shares/***SHARE1/data/***" -a**
  where **/shares/***SHARE1/data* is the path of the data you are restoring.
- To recover data to a different location
  recover -s *backupservername* **-c** *snapservername* **-f -i -a R -d "/shares/***SHARE1/relocated_data/***" "/shares/***SHARE1/Data/***"**
  where **/shares/***SHARE1/relocated_data/* is the path to the new target location for the restore operation; and where **/shares/***SHARE1/Data/* is the path of the data you are restoring.

To Retrieve Data from an Archival Backup Operation

1 Using an SSH client, connect to the Snap Server and login using the admin user name and password.

2 To change to superuser, enter the following command and press Enter:

su -

3 At the prompt, enter the admin user password, and press Enter.

4 Enter one of the following commands, and then press Enter:

- To retrieve data to its original location:
  nsrretrieve -f -i -s *backupservername* **-A** *annotation* **"/shares/***SHARE1/data/***"**
  where **/shares/***SHARE1/data/* is the path of the data you are restoring.
- To retrieve data to different location:
  nsrretrieve -f -iR -d "/shares/*SHARE1/new_dir***" -s** *backupservername*
  -A *"annotation"* **"/shares/***SHARE1/Data/***"**
  where **/shares/***SHARE1/new_dir"* is the path to the new target location for the restore operation; where *annotation* is the name of the Legato backup; and**/shares/***SHARE1/Data/"* is the path of the data you are restoring.

Term	Definition
access permissions	A rule associated with a share, a file, or a directory to regulate which users can have access to the share and in what manner.
ACL (access control list)	The list that controls access to directories and files. Each ACL includes a set of access control entries, which contain the metadata that the system uses to determine access parameters for specified users and groups.
Administration Tool	A Web-based utility used for configuration and ongoing maintenance, such as monitoring server conditions, configuring e-mail alerts for key events, or for SNMP management.
ADS (Active Directory Service)	The preferred authentication method for Windows XP, Windows 2000, Windows 2000 Advanced Server, and Windows 3000 network users. This authentication allows Active Directory users to connect to shares on the Snap Server. The Snap Server supports the Microsoft Windows 2000 family of servers that run in native ADS mode or in mixed NT/ADS mode.
AFP (AppleTalk Filing Protocol)	A local area network (LAN) architecture built into all Apple Macintosh computers.
agent	A program that performs some information-gathering or processing task in the background. Snap Servers support a number of backup agents and can be configured as SNMP agents.
algorithm	A sequence of steps designed to solve a problem or execute a process.
AllLocalUsers group	The default group for all local users on Snap Servers. Local users are set up by the Snap Server administrator. Network users or Windows domain users are not part of the AllLocalUsers group.
AllUsers group	A collection of all users. The Snap Server automatically maintains the AllUsers group.
array	A series of objects, all of which are the same size and type. In a server context, an array refers to the grouping of hard drives into a RAID set.

Term	Definition
authentication	The validation of a user's identity by requiring the user to provide a registered login name and corresponding password.
autonegotiation	An Ethernet feature that automatically negotiates the fastest Ethernet speed and duplex setting between a port and a hub or switch. This is the default setting and is recommended.
autosensing	An Ethernet feature that automatically senses the current Ethernet speed setting.
bonding	A technology that treats two ports as a single channel, with the network using one IP address for the server. Snap Servers support load balancing and failover bonding modes.
CA eTrust Antivirus	The antivirus software bundled with the Snap Server.
chaining	A native Snap Server technology in which all snapshots of a volume depend on successive snapshots for part of their content.
channel	A communications path between two computers or devices.
CHAP Authentication	The Challenge Handshake Authentication Protocol verifies the identity of the peer using a three-way handshake.
checksum	The result of adding a group of data items that are used for checking the group. The data items can be either numerals or other character strings treated as numerals during the checksum calculation. The checksum value verifies that communication between two devices is successful.
CIFS (Common Internet File System)	A specification for an Internet file access protocol that complements HTTP and FTP and reduces access time.
daemon	A process that runs in the background.
default gateway	The router used when there is otherwise no known route to a given subnet.
degraded	A RAID state caused by the failure or removal of a disk drive in which data is consistent but there is no redundancy.
DHCP (Dynamic Host Configuration Protocol)	A communications protocol that lets network administrators centrally manage and automate the assignment of IP addresses on a computer network. Each system that connects to the Internet/intranet needs a unique IP address. The Snap Server can be configured to perform as a DHCP server and assign IP addresses with a single subnet.
directory	A virtual folder used to organize files. Also called a folder.

Term	Definition
disaster recovery	A strategy that allows a company to return to normal activities after a catastrophic interruption. Through failover to a parallel system or by restoration of the failed system, disaster recovery restores the system to its normal operating mode.
disk	A rigid platter, usually constructed of aluminum or mylar, with a magnetic surface that allows the recording of data, that is stored inside the drive.
DNS server (Domain Name System server)	The server that maintains a mapping of all host names and IP addresses. Normally, this mapping is maintained by the system administrator, but some servers support dynamic mappings.
domain	A set of network resources in Windows NT and Windows 2000, such as users and groups of users. A domain may also include multiple servers on the network. To gain access to these network resources, the user logs into the domain.
domain name	The ASCII name that identifies the domain for a group of computers within a network.
Ethernet	The most widely installed local area network technology. 10Base-T Ethernet provide transmission speeds of up to 10 Mbps. Fast Ethernet or 100Base-T provides transmission speeds up to 100 Mbps and is typically used for LAN backbone systems, supporting workstations with 10Base-T cards. Gigabit Ethernet provides an even higher level of backbone support at 1000 Mbps (one Gigabit or one billion bits per second).
Ethernet address	The unique six-digit hexadecimal (0-9, A-F) number that identifies the Ethernet interface.
Ethernet port	The port that houses the network card to provide Ethernet access to the computer.
event	Any significant occurrence in the system that may require notifying a system administrator or adding an entry to a log.
failover	A strategy that enables one Ethernet port to assume the role of another port if the first port fails. If a port fails on a Snap Server, the second port assumes its network identity (if the two Ethernet cards have been configured for failover). When the port comes back online, the original identities are restored. Failover is possible only in a dual-Ethernet configuration.

Term	Definition
FTP (File Transfer Protocol)	A standard Internet protocol that provides a way to exchange files between computers on the Internet. By default, a Snap Server is set up to be an FTP server.
full-duplex	A type of transmission that allows communicating systems to both transmit and receive data simultaneously.
gateway	The hardware or software that bridges the gap between two network subnets. It allows data to be transferred among computers that are on different subnets.
GID (group IDs)	On a Snap Server, the unique ID assigned to each group for security purposes.
GuardianOSImage.gsu	An image file used to upgrade the GuardianOS.
half-duplex	A type of transmission that transfers data in one way at a time.
hidden share	A share that restricts the display of the share via the Windows (SMB), Web View (HTTP/HTTPS), FTP, and AppleTalk (AFP) protocols.
host name	The unique name by which a computer is known on a network. It is used to identify the computer in electronic information interchange.
hot spare (local or global)	A disk drive that can automatically replace a damaged drive in a RAID 1 or 5. If one disk drive in a RAID fails or is not operating properly, the RAID automatically uses the hot spare to rebuild itself without administrator intervention. A *local* hot spare is associated with and available only to a single RAID. A *global* hot spare is associated with a single RAID, but may be used for any RAID in the system.
hot swapping	The ability to remove and add disk drives to a system without the need to power down or interrupt client access to file systems.
HTTP (Hypertext Transfer Protocol)	An application protocol for transferring files (text, graphic images, sound, video, and other multimedia files) over TCP/IP on the World Wide Web.
HTTPS (Hypertext Transfer Protocol Secure)	The HTTP protocol using a Secure Sockets Layer (SSL). SSL provides data encryption, server authentication, message integrity, and client authentication for any TCP/IP connection.

Term	Definition
I/O (input/output)	The operation of transferring data to or from a device, typically through an interface protocol like CIFS, NFS, or HTTP. The Snap Server presents a file system to the user and handles block I/O internally to a RAID array.
Inheritance	In Windows permissions, inheritance is the concept that when permissions for a folder are defined, any subfolders within the defined folder inherit its permissions. This means administrator need not assign permissions for subfolders as long as identical permissions are desired. Inheritance greatly reduces administrative overhead and also results in greater consistency in access permission management.
iSCSI	Internet SCSI (iSCSI) is a standard that defines the encapsulation of SCSI packets in TCP and then routing it using IP. It allows block-level storage data to be transported over widely used IP networks.
IP (Internet Protocol) address	The unique 32-bit value that identifies the location of the server. This address consists of a network address, optional subnetwork address, and host address. It displays as four addresses ranging from 1 to 255 separated by periods.
Jukebox	A robotic tape backup device that stores numerous tape drives and uses a mechanical arm to bring the drive to a station for reading and writing.
JVM (Java Virtual Machine)	Software that converts Java bytecode into machine language and executes it. A JVM allows an application such as Snap Server Manager written in Java to run on any operating system.
Kerberos	A secure method for authenticating a request for a service used by ADS. Kerberos lets a user request an encrypted “ticket” from an authentication process that can then be used to request a service from a server. The user credentials are always encrypted before they are transmitted over the network. In Windows 2000/XP, the domain controller is the Kerberos server. The Kerberos key distribution center (KDC) and the origin of group policies are applied to the domain.
LCD (liquid crystal display)	An electronic device that uses liquid crystal to display messages on some Snap Servers.
LED (light-emitting diode)	An electronic device that lights up when electricity is passed through it.

Term	Definition
Linux	A UNIX-like OS that was designed to provide personal computer users a free or very low-cost operating system comparable to traditional and usually more expensive UNIX systems. The GuardianOS is based on the Linux OS.
load balancing	A process available only in dual-Ethernet configurations. The Ethernet port transmission load is distributed among two network ports (assuming the cards are configured for load balancing). An intelligent software adaptive agent repeatedly analyzes the traffic flow from the server and distributes the packets based on destination addresses.
local group/local user	A group/user defined locally on a Snap Server using the Administration Tool. The local user is defined by the server administrator. Windows domain, ADS, and NIS users are not considered local.
MAC (Media Access Control)	In the Open Systems Interconnection (OSI) model, one of two sublayers of the Data Link Control layer. Concerned with sharing the physical connection to the network among several computers. Each Ethernet port has a unique MAC address. Snap Servers with dual-Ethernet ports can respond to a request with either port and have two unique MAC addresses.
maintenance mode	A series of HTML screens that allow you to perform repair, upgrade, or reinstall the GuardianOS in a disaster recovery situation.
MIB (Management Information Base)	A formal description of a set of network objects that can be managed using the Simple Network Management Protocol (SNMP). The format of the MIB is defined as part of SNMP.
mirroring	Used in RAID 1, a process of storing data on one disk and copying it to one or more disks, creating a redundant storage solution. RAID 1 is the most secure method of storing mission-critical data.
mounted	A file system that is available.
multihomed	A Snap Server that is connected to two or more networks or has two or more network addresses.

Term	Definition
NAS (network attached storage)	Hard disk storage that is set up with its own network address as opposed to being attached to the department computer that is serving applications to a network's workstation users. By removing storage access and its management from the department server, both application programming and files can be served faster because they are not competing for the same processor resources. The NAS device is attached to a local area network (typically an Ethernet network) and assigned an IP address.
NetVault for GuardianOS	A comprehensive backup solution that is preinstalled on Snap Servers running GuardianOS v2.6 or higher to support backup and restore operations to a local tape drive.
NFS (Network File System)	A client/server application that allows a computer user to view and optionally store and update files on a remote computer as though they were on the user's own computer. The user's system needs to have an NFS client and the other computer needs the NFS server. The Snap Server is configured as an NFS server by default.
NIS (Network Information Service)	A network naming and administration system for smaller networks that was developed by Sun Microsystems. NIS+ is a later version that provides additional security and other facilities. The Snap Server accepts NIS users and groups.
node	Any device, including servers, workstations, or tape devices, that are connected to a network; also the point where devices are connected.
nvdb directory	A NetVault for GuardianOS database directory stored on the Snap Server that holds records for the media and backups performed.
orphan	A disk drive that has become disconnected from its RAID either by accidental removal of the drive or the intermittent failure of the drive.
parity	Error correction data. RAID 5 stores equal portions of each file on each disk and distributes parity information for each file across all disks in the group. This distributed parity allows the system to recover from a single disk drive failure.
Permissions	A security category, such as no access, read-only, or read-write, that determines what operations a user or group can perform on folders or files.
PoP (Proof of Purchase)	The number used to obtain a license key for an upgrade to third-party applications.

Term	Definition
POSIX (Portable Operating System Interface)	A set of standard operating system interfaces based on the UNIX operating system. The need for standardization arose because enterprises using computers wanted to develop programs that could run on multiple platforms without the need to recode. The Snap Server uses Extended POSIX ACLs.
protocol	A standardized set of rules that specifies the format, timing, sequencing, and/or error checking for data transmissions.
public access share	A share that allows all users read/write access to the file system.
quota	A limit on the amount of storage space on a volume that a specific user or NIS group can consume.
RAID (redundant array of independent disks)	A collection of disk drives that act together as a single storage system. Different RAID types provide different levels of data protection.
RAID 0 (Striped)	Distributes data evenly among all disks in the array. This technique, called data striping, results in fast access speeds because it uses multiple physical devices to store the data. However, RAID 0 offers no redundancy and does not accept hot spares. If a single disk drive fails, every file in the RAID is rendered unavailable.
RAID 1 (Mirrored)	Stores data on one disk drive and copies it to another drive in the RAID. A RAID 1 must contain at least two disk drives: one for the data space and one for redundancy. Although the data space in a RAID 1 can never be larger than a single drive, some administrators prefer to add a third drive (either as a hot spare or a member) for additional redundancy. RAID 1 is the most secure method for storing mission-critical data because there is no catastrophic data loss when a disk fails. However, RAID 1 is the most expensive and least efficient storage method.
RAID 5 (Striping with Parity)	Distributes data evenly among all disks in the array, and maintains parity information (error correction data) that allows the system to recover from a single disk drive failure. RAID 5 provides the best combination of performance, usability, capacity, and data protection.
recurring snapshot	A snapshot that runs at an administrator-specified time and interval.

Term	Definition
restrict anonymous	A Windows feature in which anonymous users cannot list domain user names and enumerate share names. Microsoft has provided a mechanism in the Registry called restrict anonymous for administrators to restrict the ability for anonymous logon users (also known as NULL session connections) to list account names and enumerate share names. The implementation of the restrict anonymous mechanism may prevent the Snap Server from obtaining the list of account names it needs to authenticate Windows domain users.
resynchronization	A RAID state that describes the process of integrating a new drive into the RAID.
rollback	A snapshot feature that allows the administrator to restore a volume to a previous state as archived in a snapshot without resorting to tape.
S2S (Server-to-Server Synchronization)	A SnapExtension that copies the contents of a share from one Snap Appliance server to another share on one or more different Snap Servers. S2S is designed to work with Snap Servers and other Snap Server Storage Solutions.
SCSI (Small Computer System Interface)	A parallel interface standard used to attach peripheral devices, such as robotic libraries, to computers.
serial number	The ten-character alphanumeric number assigned by the manufacturer at the factory.
server number	A numeric derived from the MAC address of your Snap Server's primary Ethernet port that is used to uniquely identify a Snap Server.
share	A virtual folder that maps to the root of a volume or a directory on the volume. Permissions are assigned to a share that determine access for specific users and groups.
share access	Permissions granted or denied to users and groups that control user and group access to the files.
SMB (Server Message Block)	A protocol for Windows clients. SMB uses the TCP/IP protocol. It is viewed as a complement to the existing Internet application protocols such as FTP and HTTP. With SMB, you can access local server files, obtain read-write privileges to local server files, share files with other clients, and restore connections automatically if the network fails.
Snap Server Manager	A Java-based utility for discovering and monitoring Snap Servers.

Term	Definition
SnapDRImage	The Snap Server disaster recovery image that saves server-specific settings such as server name, network, RAID, volume and share configuration, local user and group lists, and snapshot schedules.
SnapExtension	A Java application that extends a Snap Server's functionality. SnapExtensions are produced both by Snap Appliance and third-party vendors.
snapshot	A consistent, stable, point-in-time image of a volume (file system) used for backup purposes.
snapshot pool	Disk space reserved within a RAID for the storage of snapshot data. In the default storage configuration of many Snap Servers, twenty percent of the RAID capacity is allocated to the snapshot pool.
snapshot share	A virtual folder that allows access to all current snapshots at the same directory level as the original share on which it is based.
SnapTree Directory	A directory residing in the root of a volume that is assigned a Windows- or UNIX-style security model. The security model determines the file-level security scheme that will apply to files, folders, and subdirectories within the SnapTree directory.
SNMP (Simple Network Management Protocol)	A system to monitor and manage network devices such as computers, routers, bridges, and hubs. SNMP views a network as a collection of cooperating, communicating devices, consisting of managers and agents.
SSH (secure shell)	A service that provides a remote console for special system administration and customer support access to the server. SSH is similar to telnet but more secure, providing strong encryption so that no passwords cross the network in clear text.
SSL (Secure Sockets Layer)	A technology that provides data encryption, server authentication, message integrity, and client authentication for any TCP/IP connection.
standalone	A network bonding mode which treats each port as a separate interface. This configuration should be used only in multihomed environments in which network storage resources must reside on two separate subnets.

Term	Definition
static IP address	An IP address defined by the system administrator rather than by an automated system, such as DHCP. The Snap Server allows administrators to use DHCP-assigned or statically assigned IP addresses.
striping	A RAID storage technique that distributes data evenly among all disks in the array.
subnet mask	A portion of a network that shares a common address component. On TCP/IP networks, subnets are all devices with IP addresses that have the same prefix.
TCP/IP (Transmission Control Protocol/Internet Protocol)	A commonly used networking protocol that supports the interconnection of different network operating systems.
trap	A signal from the Snap Server informing an SNMP management program that an event has occurred.
U	A standard unit of measure for designating the height in computer enclosures and rack cabinets. One U equals 1.75 inches. For example, a 3U server chassis is 5.25 inches high.
UID (user IDs)	A unique ID assigned to each user on a Snap Server for security purposes.
unassigned	The state of a disk drive that is seated in a bay but has not been incorporated into a RAID.
UNC (Universal Naming Convention)	In a network, a way to identify a shared file in a computer without having to specify (or know) the storage device it is on. In the Windows OS, the UNC name format is as follows: *\\server_name\share_name\path\file_name*
UPS (uninterruptable power supply)	A device that allows a computer to keep running for a short time when the primary power source is lost. It also provides protection from power surges. A UPS device contains a battery that starts when the device senses a loss of power from the primary source.
URL (Uniform Resource Locator)	A Web address.
volume	A logical partition of a RAID's storage space that contains a file system. In the default storage configuration of many Snap Servers, eighty percent of the RAID capacity is allocated to the default volume.
Web View	The Web-browser screen that opens when users access a Snap Server using their Web browsers, and displays a list of all shares.

Term	Definition
Windows domain authentication	Windows-based networks use a domain controller to store user credentials. The domain controller can validate all authentication requests on behalf of other systems in the domain. The domain controller can also generate encrypted challenges to test the validity of user credentials. Other systems use encrypted challenges to respond to CIFS/SMB clients that request access to a share.
WINS (Windows Internet Naming Service)	The server that locates network resources in a TCP/IP-based Windows network by automatically configuring and maintaining the name and IP address mapping tables.
workgroup	A collection of computers that are grouped for sharing resources such as data and peripherals over a LAN. Each workgroup is identified by a unique name.

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